The Electrical Industry's Weekly Magazine

December 29, 1958

Electrical World

Price 50 Cents

A McGraw-Hill Publication

OUTLOOK FOR '59: Trends in 11 Key Areas

RESEARCH—How Much, for What?

ATOMIC—Aim to Avoid Domination

INDUSTRIAL—Kwhrs to Cut Costs

PURCHASING—Who Pays the Piper?

POLITICAL—Stop Treating Symptoms

METHODS—There Is a Better Way

METERING—Sample Tests Lead List

CONTINUITY—Data, Then Standards

DISTRIBUTION—Underground Coming

TRANSMISSION—Must Build Bigger

PEAKING—Units to Fit th

. . . pages 38-48

STEVENS RICE GS W
UNIVERSITY MICROFILMS I
313 N 1 ST
ANN ARBOR MICH

HOW PROGRESS IN BUSHING STANDARDIZATION HELPS UTILITIES

New General Electric TBI* Bushings will lower utility inventory costs

Electric utilities can expect to save $5,000,000 in the next few years by cutting their bushing inventories as much as 75 percent. The savings will be the result of General Electric's company-wide effort to standardize on *only eight basic bushings* within the entire 23-kv to 196-kv ASA range. The new bushings will be directly interchangeable between power transformers, medium transformers and oil circuit breakers of the same voltage class.

The new standard transformer and circuit breaker bushings, called the TBI (Transformer Breaker Interchangeable) line, provide another weapon to fight inflationary cost trends. The TBI line will simplify ordering and stocking procedures by reducing the number of bushing ratings needed. This will permit electric utilities to reduce bushing inventories or to pool inventories within their system.

Only a manufacturer of both bushings and associated power apparatus could effect the standardization which the TBI line provides. By combining the engineering, research and manufacturing skill for its power transformers, circuit breakers and medium transformers, General Electric was able to achieve these extra values for the nation's utilities.

For more information on General Electric's TBI bushings, contact your nearest Apparatus Sales Office.

*Transformer Breaker Interchangeable. Tradename of the General Electric Co.

301-393

TBI

GENERAL ELECTRIC

MORE POWER TO AMERICA

GENERAL ELECTRIC

Electrical World

Vol. 150, No. 26 DECEMBER 29, 1958

Published for 84 years for those engaged in the business of generating, transmitting, distributing, or applying electric power

In This Week's Issue

p 34

CURRENT EVENTS

Corette Stresses Stability, Progress

Review of 1958: records in generation, construction. . Residential use impressive against recession background...p 34

MANAGEMENT NEWSLETTER

'59 Outlook for a Dozen Industries

McGraw-Hill's Economics Dept surveys U. S. business, comes up with this outlook for 12 big kwhr users.....p 87

Staff Report

OUTLOOK FOR '59

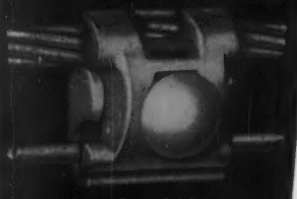
Trends in 11 Key Areas

RESEARCH–How Much and For What?...p 38
ATOMIC–Aim to Avoid Domination.....p 40
INDUSTRIAL–Kwhrs to Cut Costs.....p 40
PURCHASING–Who Pays the Piper.....p 42
POLITICAL–Stop Treating Symptoms ....p 42
METHODS–There Is a Better Way.....p 44
METERING–Sample Testing Leads List...p 44
CONTINUITY–Data, Then Standards....p 44
DISTRIBUTION–Underground Coming...p 46
TRANSMISSION–Must Build Bigger .....p 46
PEAKING–Units to Fit the Need.....p 48

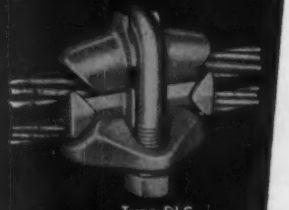
Departments

Editorials 33
• Electrical Week 13
Engineering Reference Sheet 53
Executive Reader 16
From the Publisher..... 5
How To 58
• Management Newsletter ... 87
Manufacturers News 70
New Equipment 92
News About People..... 96
Readers Forum 102
Readers Service 95
Sales Assignments 99
Selling 78
INDEX TO ADVERTISERS...102

Type AAW

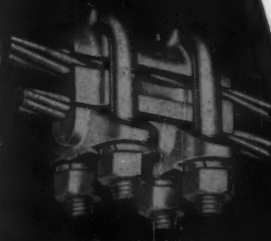


Type PAA



Type DLC

Type W



Type 2U AA

Type PAA 400

There's a BLACKBURN clamp for every ALUMINUM CONNECTION

Always Use Blackburn Aluminum Fittings When Terminating or Joining Aluminum Conductors

- Each clamp accommodates a wide range of conductors.
- Castings are high-strength, corrosive-resistant, heat treated aluminum alloy.
- Blackburn special surface treatment eliminates production oxides and improves conductivity.
- Bell contoured grooves protect conductors. Clamping forces are distributed over extra-large contact area.
- Available with galvanized steel or aluminum hardware. Aluminum hardware is alumilited to prevent seizing.
- Can be quickly and easily installed with regular linemen's equipment. No special tools required.

IMPORTANT: We recommend the use of CONTAX on all aluminum connections. CONTAX is an oxide inhibiting compound with an ASTM drop point of 549° F.

BLACKBURN *Aluminum* FITTINGS

JASPER BLACKBURN CORPORATION
1525 Woodson Rd., St. Louis 14, Mo.,
Wydown 3-9430

What's Happening to Industrial Use?

We have been observing some rather startling statistics in the past few days that may reflect important new trends. Looking over reports for November we find that industrial production moved ahead of 1957 going from an F.R.B. index of 139 to 141 in 1958. On a comparative basis, the number of factory production workers was still 800,000 below 1957. In other words, production increased 1.4% with 6.3% fewer workers.

During November the total output of electricity averaged an increase of about 4.5%, which could be accounted for primarily by the residential and small light and power customers. It would appear, therefore, that this startling increase in productivity may not have been due to the use of a great deal more power. The new and more efficient machines may be producing more with less manpower but without proportionate increases in electric power.

We would be very interested in seeing power use statistics on some of the new and modernized plants, compared with output. Maybe the electrical industry is not going to be the automatic gainer from the new trend.

Fischer Black

Electrical World Staff

Fischer Black Publisher and Editor
Daniel T Braymer Assistant to the Editor

Engineering
Leonard M Olmsted Managing Technical Editor
John J Kearney Assistant Managing Technical Editor
Howard S Knowlton New England Editor, Boston
Edward Allen Midwestern Editor, Chicago
Francis J Kovalcik Middle Eastern Editor
David Rea Southeastern Editor, Atlanta
Charles F Hochgesang Western Editor, San Francisco
Rue M Shoop Associate Editor
George Swift Associate Editor
Kenneth N McLean Northeastern and Industrial Editor
Leon A Allen, Jr Assistant Editor
Archer E Knowlton Consulting Editor

News
Herbert R Frankel Managing News Editor
Thomas R Jordan Assistant Managing News Editor
Theodore Fuller News Editor
Michael G Duerr Assistant News Editor
John D Damon Commercial Editor
George B. Bryant, Jr Manager Washington Bureau

Special Services
Arthur J Stegeman Manager, Market Research
Dexter M Keezer Director, Economics Department
E Russell Eggers Economist

Production
Jesse A Mock Manager of Production
Frank C Stockman Art Director
H Tomlinson Howland, Jr Associate Art Director
James G Plunkett Associate Editor
Donald J Sullivan Assistant Production Editor

Advertising
Warren W Shew Sales Manager
District Managers: W R Klein, L R Lawrence, D J Roberts, New York; L R Lawrence, Boston; F P Coyle, Philadelphia; M S Kearney, E F Coffey, Jr, Cleveland; E F Coffey, Jr, Detroit; M S Kearney, Pittsburgh; W H Meneilley and J T Schaefer, Chicago; J T Schaefer, St. Louis; Russell Antles, Los Angeles; R C Alcorn and T H Carmody, San Francisco; Robert H Powell, Atlanta; Gordon Jones, Dallas; John Patten, Denver.
Otto A Drechsel Business Manager
John F Dugan Assistant Business Manager
Donald K Ellis Promotion Manager

E Bryson Sessions Circulation and Sales Service Manager

ELECTRICAL WORLD
Vol. 150, No. 26, Dec. 29, 1958

Published weekly by McGraw-Hill Publishing Co., Inc., James H. McGraw (1860-1948), Founder. Executive, Editorial, Circulation and Advertising Offices: McGraw-Hill Building, 330 West 42nd Street, New York 36, N. Y. Printed at 99-129 North Broadway, Albany 1, N. Y. See panel at right for information regarding subscriptions or change of address.

Donald C. McGraw, President; Joseph A. Gerardi, Executive Vice-President; L. Keith Goodrich, Vice-President and Treasurer; John J. Cooke, Secretary; Nelson Bond, President, Publications Division; Shelton Fisher, Senior Vice-President; Ralph B. Smith, Vice-President and Editorial Director; Joseph H. Allen, Vice-President and Director of Advertising Sales; A. R. Venezian, Vice-President and Circulation Coordinator.

Subscriptions are solicited from executive, supervisory, and engineering personnel in electric utilities, manufacturing companies, and related fields; and from consulting engineers and electrical engineers in industry. Position and company connection must be indicated on subscription orders. Send to address shown in box at right.

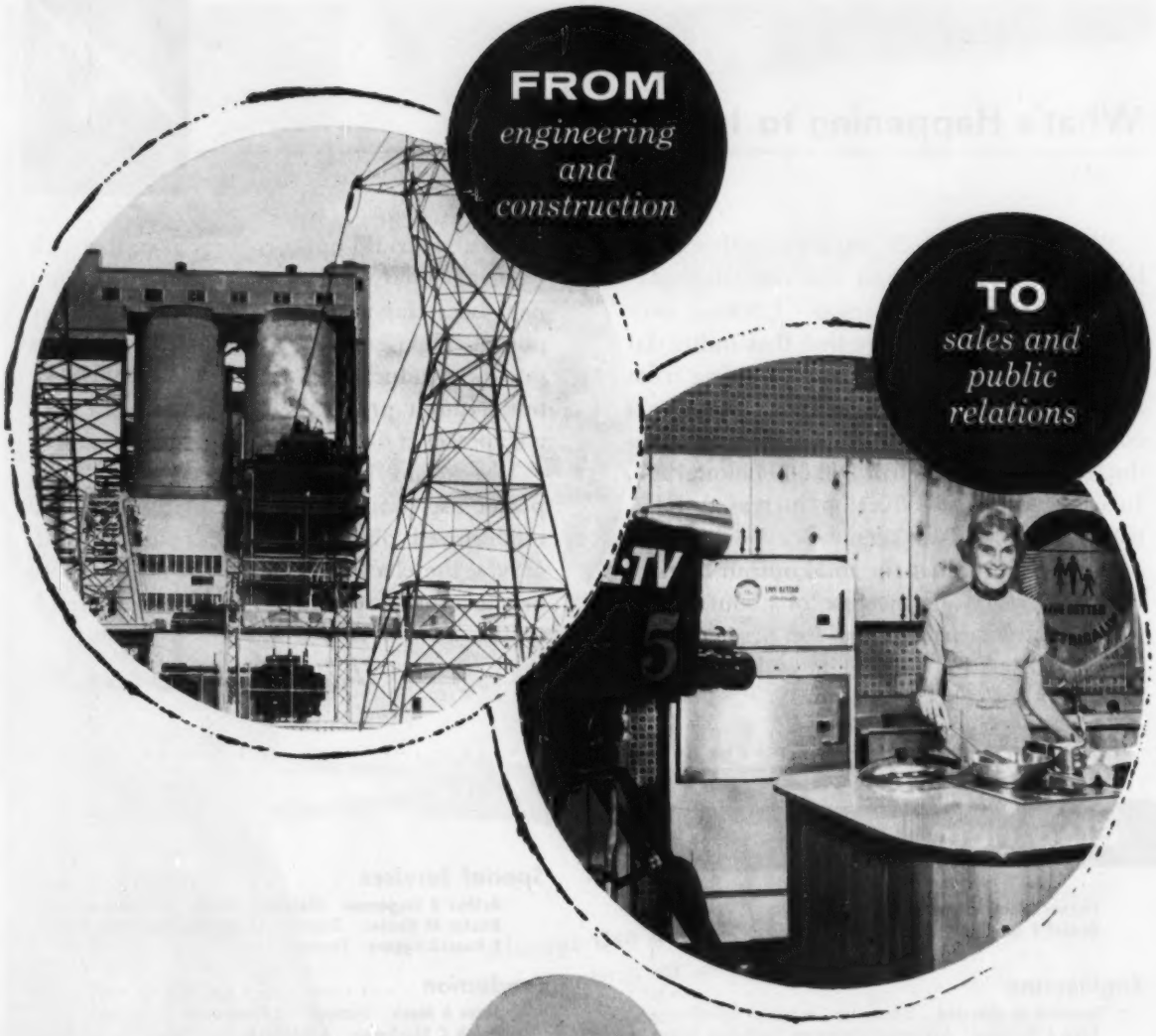
United States and Canada subscription rate for individuals in the field of the publication $6.00 per year; single copies 50 cents. Other Western Hemisphere and the Philippines $20.00 payable in advance and other countries $30.00 payable in advance.

Second-class postage paid at Albany N. Y. Title registered in U. S. Patent Office.

©Copyright 1958 McGraw-Hill Publishing Company, Inc. All rights reserved. Permission required to reproduce any of contents. Printed in U.S.A.

SUBSCRIPTION AND ADDRESS CHANGES: Send subscription correspondence and change of address to Fulfillment Manager, ELECTRICAL WORLD, 330 West 42nd Street, New York 36, N. Y. Subscribers should notify Fulfillment Manager promptly of any change of address, giving old as well as new address, and including postal zone number, if any. If possible, enclose an address label from a recent issue of the magazine. Please allow one month for change to become effective.

Postmaster . . . Please send form 3579 to Electrical World, 330 W. 42nd St., New York 36, N. Y.



you can count on quality performance

EBASCO offers many consulting services to utilities. All carry the same stamp of quality that identifies the power plants Ebasco designs and builds.

Take Ebasco's sales and public relations service, for example. It's continually helping solve problems for utilities all over the country. As a client, it offers you a constant flow of up-to-the-minute guidance and information, providing a sound basis for your day-by-day sales and public relations operations.

Or when special sales and public relations problems arise, the broad experience acquired by Ebasco's consultants is solid assurance of a practical solution.

For more information about these services, write: Ebasco Services Incorporated, *Sales, Marketing and Public Relations Consulting Dept.*, Two Rector Street, New York 6, New York.

Other Ebasco services for utilities include: FACILITIES PLANNING • FINANCIAL AND BUSINESS STUDIES • INDUSTRIAL RELATIONS • INSURANCE, PENSIONS AND SAFETY • PURCHASING, INSPECTION AND EXPEDITING • RATES AND PRICING • RESEARCH • SYSTEMS, METHODS AND BUDGETS • TAX • VALUATION AND APPRAISAL • WASHINGTON OFFICE

Challenging career opportunities now available for qualified engineers. For further information, write to our Personnel Director.

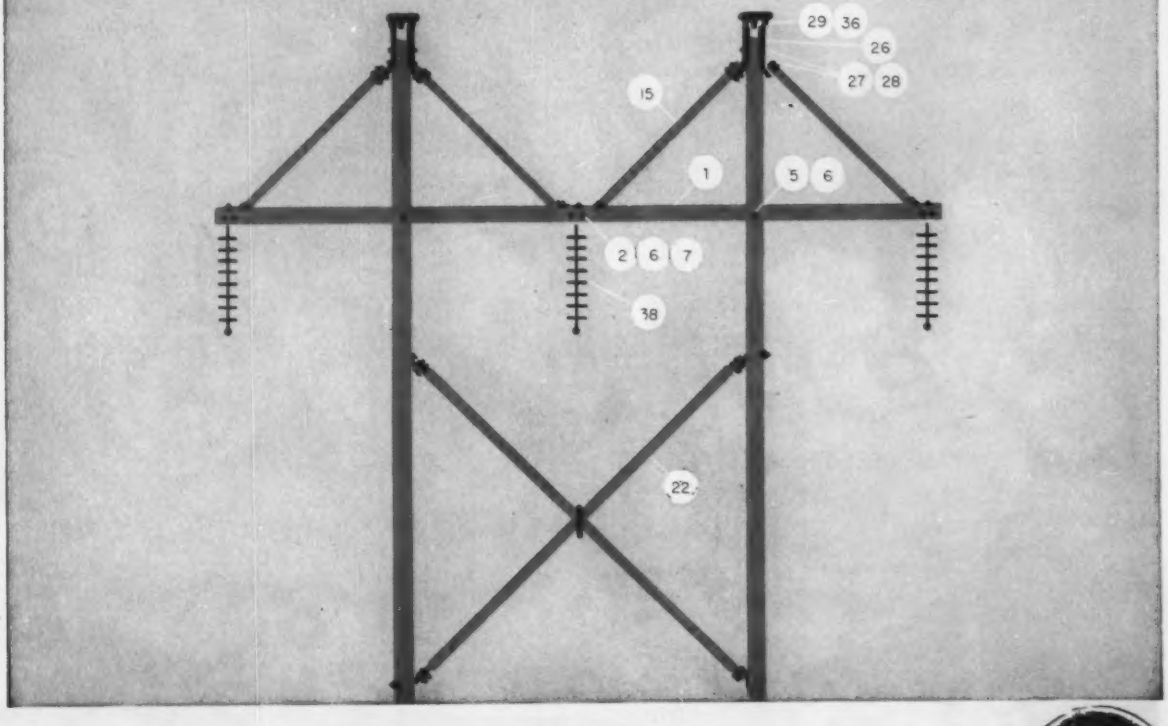
ENGINEERS · CONSTRUCTORS
EBASCO
BUSINESS CONSULTANTS
®

NEW YORK · CHICAGO
DALLAS · PORTLAND, ORE.
SAN FRANCISCO · WASHINGTON, D. C.

TANGENT W/BRACES NO. 702

H-FRAME STRUCTURE, DOUBLE PLANK CROSSARMS WITH METAL SPACERS, POLE TOP STATIC WIRE SUPPORTS, AND WOOD CROSS BRACES DESIGNED FOR 69 TO 154 KV CONSTRUCTION

DRG. REF. #	QUANTITY	DESCRIPTION	DRG. REF. #	QUANTITY	DESCRIPTION
792	2	Pole	15	4	Vee brace 3⅜" x 4⅜" cross section
1	2	Crossarm	22	1 set	Cross brace w/fittings, clamp, ⅞" pole bolts and curved washers
2	3	Steel spacer fitting w/mounting bolts	26	2	Static wire support
5	2	Stud bolt ⅞" w/washer nuts	27	4	Machine bolt ¾"
6	8	MF locknut ⅞"	28	4	MF locknut ¾"
7	1	Bent stud bolt ⅞" x 8" w/2 sq. nuts	29	2	Clevis
			36	2	Suspension clamp for static wire
7	2	Bent bolt ⅞" x 5½" w/sq. nut	38	As required	Suspension insulators and fittings



SIMPLIFY YOUR POLE LINE PROJECTS . . .

ORDER via Graybar

The combination of top quality materials and specialized Graybar service can make a substantial contribution to simplifying your pole line projects. For example, take the structure illustrated here.

These complete cross-arm units are fabricated and fitted with hardware according to *your* specifications. Every pre-bored member fits perfectly. You reduce time consumed and cost of field assembly. You can plan on a far more smoother, efficient operation and completing the job on schedule.

Need assistance in solving tough or unusual problems? In addition to our regular service, Graybar Outside Construction specialists and field representatives are always ready to share with you their specialized knowledge.

For assistance, advice, complete quotations and the quality materials that assure uninterrupted service to your customers, make your next transmission or pole line order read "via Graybar".

761

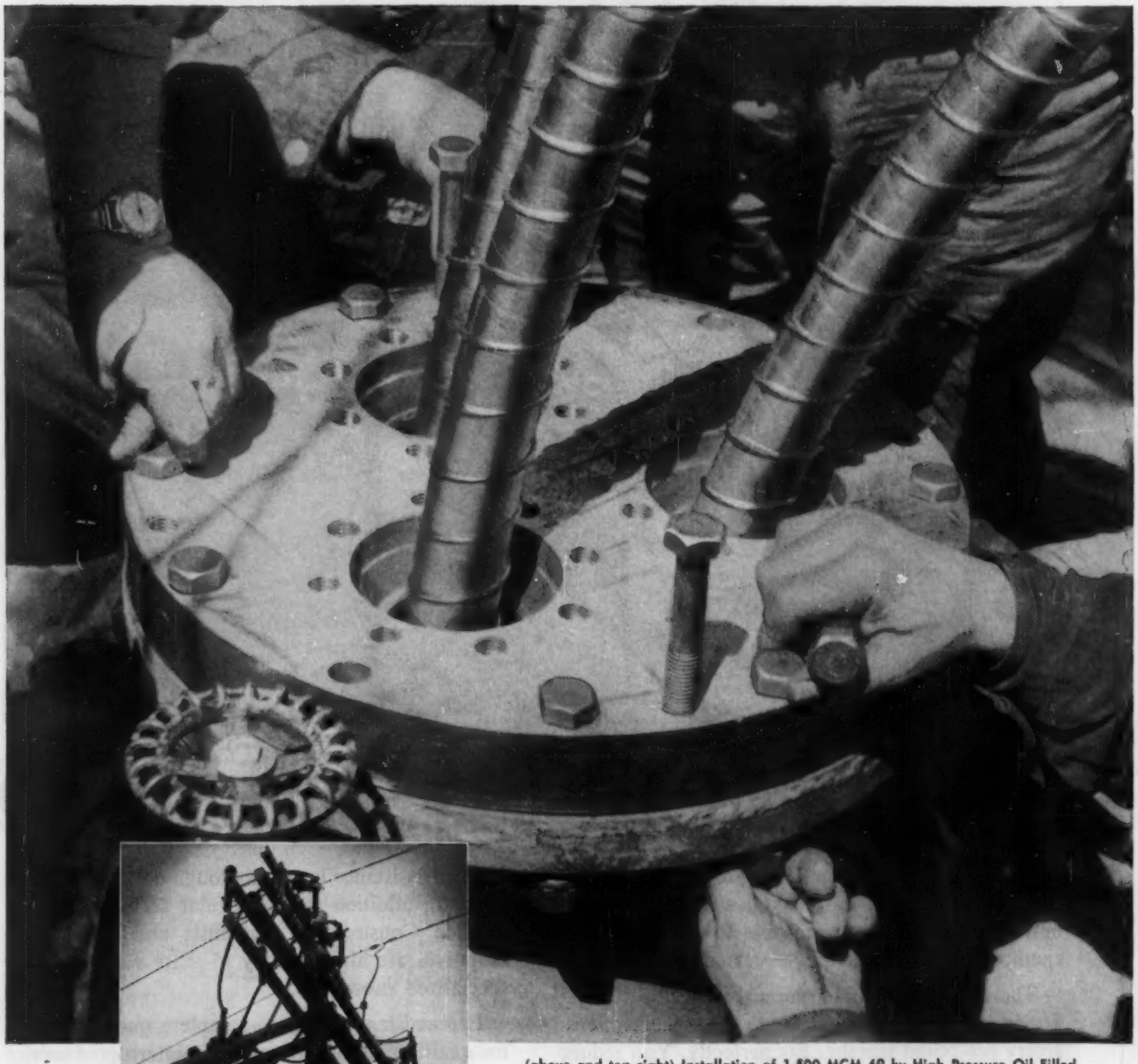
GRAYBAR ELECTRIC COMPANY, INC.
420 Lexington Avenue, New York 17, N. Y.

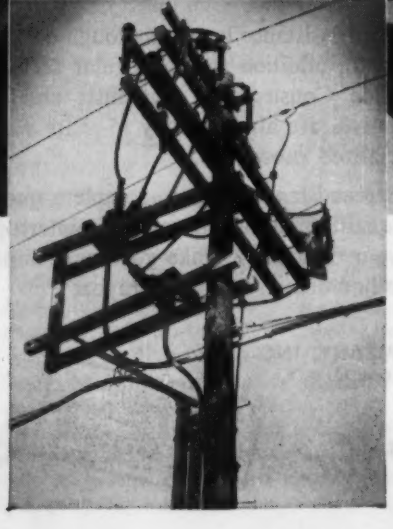
Call Graybar first for...

Everything Electrical GraybaR ELECTRIC COMPANY

IN OVER 130 PRINCIPAL CITIES

In Paper Insulated Power
GENERAL CABLE





(above and top right) Installation of 1,500 MCM 69 kv High Pressure Oil Filled Cable and Terminal at Philadelphia Electric Company.

(left) Aerial Paper Lead Cable carrying 13,800 volts; installation by Central Illinois Electric and Gas Co., Rockford, Illinois.

Cables...
means PROGRESS

(above) Baltimore Gas & Electric Company installation at large shopping center; direct earth burial cable, 2/0 triplexed 35 kv with neoprene jacket over individual conductors.

FOR OVER 60 YEARS General Cable has pioneered in new constructions and important improvements in paper insulated power cable. Developed in its own Research Laboratories and manufactured in its plants, these constructions have given excellent performance on the job for many years. Today, a leader in the field, General Cable provides a high quality product in every type of paper insulated cable.

CABLES:

- **SOLID**
- **LOW PRESSURE GAS FILLED**
- **LOW PRESSURE OIL FILLED**
- **PIPE TYPE**
  - **High Pressure Gas Filled**
  - **High Pressure Oil Filled**

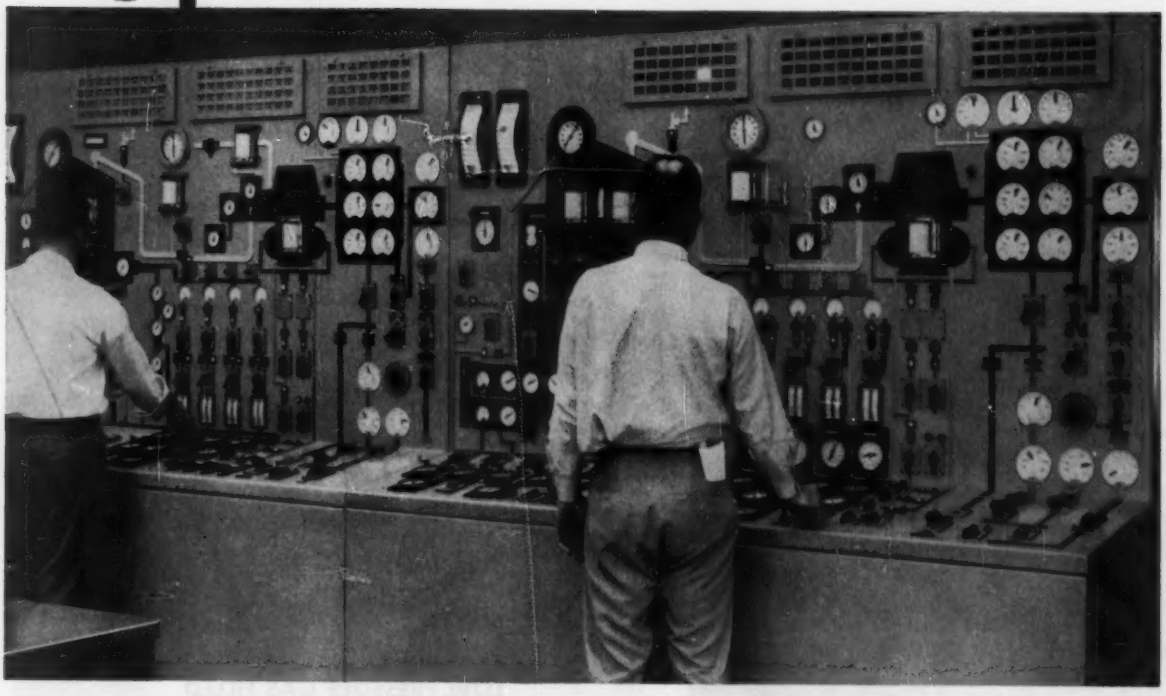
CONDUCTORS:

- **Copper and Aluminum**
- **Compack Round**
- **Compack Sector**
- **Compack Segmental**
- **Concentric**
- **Hollow Core**
- **Annular Concentric**

GENERAL CABLE CORPORATION
420 Lexington Avenue, New York 17, N.Y.
Offices and Distributing Centers Coast-to-Coast

for quality and service... **specify GENERAL CABLE**

How Copes-Vulcan control systems boost power plant efficiency



Copes-Vulcan puts combustion control at operator's finger tips

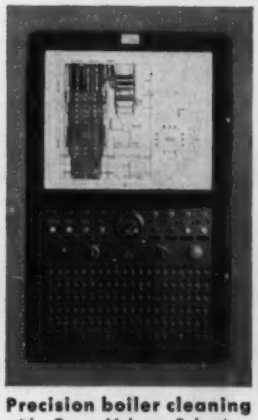
Equipped with easy-to-read recorders and control stations, this compact Copes-Vulcan panel centralizes operator control and simplifies boiler operation. This modern system features circuit simplicity with independent control loops on air flow, fuel loading and furnace draft. Drive units assure accurate positioning and fast response, and eliminate the need for interconnecting control loops.

A custom installation . . . a continuing service

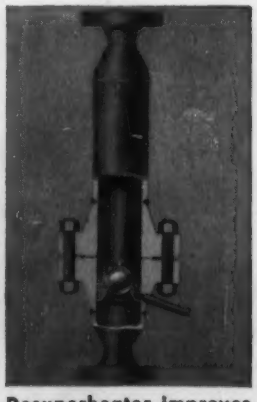
Copes-Vulcan Combustion Control is just part of an integrated boiler control system for regulating feed water, boiler steam temperature and boiler cleaning.

Whether furnished in individual units or integrated into a single system, each installation is tailored to meet specific requirements of generating capacity, load range and fuel. Copes-Vulcan supplies skilled service, when needed, for the life of the installation.

Write for Bulletin 1032 showing a Copes-Vulcan control system working at a showcase generating plant.



Precision boiler cleaning with Copes-Vulcan Selective-Sequence or Automatic-Sequential soot blowing systems. Space-saving panel permits easy monitoring, flexible programing . . . assures thorough cleaning with less steam and/or air. Write for Bulletin 1029.



Desuperheater improves temperature control. New Variable-Orifice Desuperheater* holds reduced steam temperature constant only 20° downstream from desuperheater outlet, even over a 50-to-1 load range. Write for Bulletin 1037. *Patent applied for

Copes-Vulcan Division
BLAW-KNOX COMPANY
Erie 4, Pennsylvania

50,000/66,667 Kva Pennsylvania LTC Transformer at Aurora Station Serves Taconite Mines and Processing Plants Near Duluth

Minnesota Power and Light Chose PENNSYLVANIA

Located at Minnesota Power and Light Company's Aurora Steam Electric Station near Duluth, the 50,000/66,667-kva Pennsylvania Load Tap Changing Autotransformer pictured is meeting all requirements under two extreme operating conditions. They are: widely varying load conditions peculiar to the nearby mines and processing plants of the taconite industry, and wide variations in temperature and weather that are characteristic of this northern state.

By means of 138-kv transmission lines, the transformer ties in the utility's 88,000-kw Aurora Steam Electric Station with the mining company's 150,000-kw Taconite Harbor Steam Electric Station. It feeds into the 115-kv and 44-kv transmission network of the Minnesota Power and Light Company system.

Compensating for load variations are two full-capacity taps in the high voltage and, in the low voltage, LTC equipment for ±10% regulation in 32 steps of ⅝%. The LTC is designed for future paralleling.

Whether your own transformer requirements include operating extremes or normal conditions, it will pay you to take advantage of Pennsylvania's power-transformer experience. Contact Pennsylvania Transformer Division, McGraw-Edison Company, Canonsburg, Pa.

McGRAW EDISON

PENNSYLVANIA TRANSFORMERS

PENNSYLVANIA POWER TRANSFORMERS

See next page for some facts on facilities

PENNSYLVANIA...

HAS THE FACILITIES AND THE CAPABILITY TO MEET THE LARGEST POWER TRANSFORMER REQUIREMENTS

- A large, expertly-staffed engineering department with long experience in power transformer design—both core form and shell form.
- The ability to design and construct scale models for proving design characteristics.
- A modernly equipped plant capable of producing and testing the highest rated units contemplated by industry today.
- Handling and loading facilities that permit full utilization of manufacturing, shipping and installation economies.

PENNSYLVANIA'S NEW THOMAS A. EDISON ACOUSTICAL RESEARCH LABORATORY

Located in a seven-acre area adjacent to Pennsylvania Transformer's Canonsburg plant, this super-quiet structure has complete facilities for testing and analyzing transformer noises. Vibrations are "plotted" so that the sources of noise can be pinpointed. This permits corrective measures in current production and also points the way to more effective design. In the photographs, acoustical measurements are being taken on a 10,000-kva transformer. Transformers even larger than 100,000 kva, in certain voltage classes, can be tested in the new laboratory.

McGRAW EDISON

PENNSYLVANIA TRANSFORMERS pt

PENNSYLVANIA TRANSFORMER DIVISION

McGraw-Edison Company

CANONSBURG, PENNSYLVANIA Greater Pittsburgh District

See other side for story of power transformer ruggedness

The Electrical Week

FUTURE NEWS ▶ Watch for the co-op-public power bloc to seek legislation enabling their members to participate in AEC's "partnership" power demonstration program. They will probably ask for reinstatement of the "second round" provisions, under which AEC builds the reactor and sells steam to the co-op or publicly owned utility.

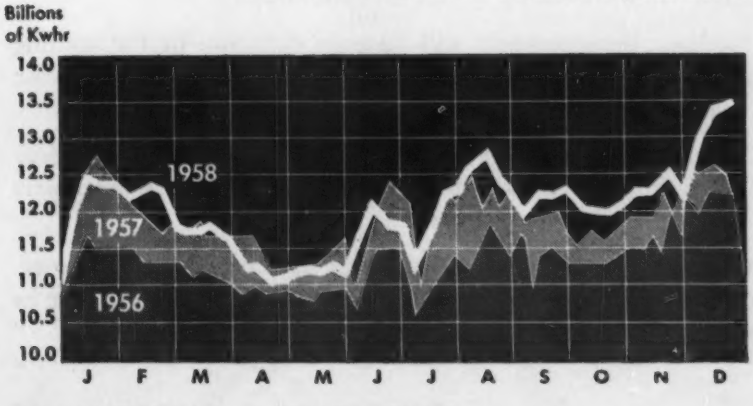
LATE NEWS ▶ Eight companies are competing for a government contract to perform research, development and design work on a fast breeder reactor using a plutonium oxide-uranium oxide fuel cycle. The eight are GE, Atomic Power Development Associates, Atomics International, Aerojet-General, Curtiss-Wright, Nuclear Development Corp, Nuclear Materials & Equipment Corp, and ACT Industries.

Sen Everett Dirkson says he will support TVA self-financing. The Illinois Republican, confident he will be next Senate Minority Leader, says he supported the measure in the previous session.

TVA increases wages for nearly 10,000 construction and maintenance workers by 4.69%. Raises were effective Dec. 28.

Management changes . . . R. T. Person becomes president of PS of Colorado, succeeding J. E. Loiseau who is new chairman; W. D. Virtue becomes exec vp, operations, and W. W. Howell is named vp and chief accounting officer . . . At South Carolina E&G: J. F. Rader to vp and chief engineer; A. M. Williams to vp and staff counsel; and A. C. Mustard to commercial vp . . . At Stone & Webster, Whitney Stone becomes chairman, R. N. Benjamin becomes president; and P. J. Rempe is elected president of the S&W's Service Corp . . . Sylvania elects R. E. Lewis as president, succeeding D. G. Mitchell who remains as board chairman . . . D. C. Van Meter elected vp of N. W. Ayer & Son in charge of ECAP account; E. R. Dunning remains as Ayer vp and consultant to ECAP . . . J. J. Kearney of EW joins EEI as staff assistant and secretary to committee on A-power.

POWER OUTPUT—UP 9.0% (Week ending Dec. 20), Kwhr 13,534,000,000



Per Cent Change From Previous Year

	Dec. 6	Dec. 13	Dec. 20
Total U. S. ..	+8.7	+7.8	+ 9.0
New Eng. ..	+8.9	+9.6	+11.4
Mid. Atlantic.	+6.1	+6.4	+ 7.9
Cent. Ind...	+6.2	+7.7	+ 9.9
West Cent..	+7.6	+9.4	+10.0
Southeast ...	+4.0	+5.1	+10.2
South Cent..	+6.9	+8.3	+ 6.5
Rocky Mount.	+6.7	+7.6	+ 7.6
Pacific			
NW	+3.5	+7.3	+ 7.0
SW	+5.2	+6.3	+ 7.9

Seasonally Adjusted Index 246.1

Week Ago 246.0 Year Ago 225.3

Source: Edison Electric Institute

A TWO-MINUTE PREVIEW OF THIS ISSUE

EVENTS ▶ **EEI President J. E. Corette reviewed the progress made in '58** by the electric utility industry. In spite of the recession, the worst since World War II, the utility industry not only held its own in most areas, it also set some records in new capacity, residential use, revenues and construction spending. Read the detailed story of Corette's comments on **p 34.**

Citations have been made to five power companies for 1958 accomplishments deemed most important to the industry and the public. The five have been invited to submit presentations for the Edison Award, previously known as the Coffin Award. They are Alabama Power Co, Arizona Public Service Co, Idaho Power Co, Pacific Gas & Electric Co, and Philadelphia Electric Co. The reasons for each company being considered for the award are outlined on **p 37.**

THE OUTLOOK ▶ **Outlook for 1959—Eleven key areas:** Electrical World again examines the prospects for electric utilities in 1959 in 11 areas of activity or responsibility. These run the gamut from research to metering to politics. The following is a brief rundown on each of these areas, beginning on **p 38.**

- **Research** is rapidly coming to be considered essential to survival. The task in '59 is to decide what and how much to do; and to then go about doing it on a coordinated basis.

- **Atomic power** may well be the biggest single challenge of '59. Problem is to move ahead along timely, imaginative lines, and at the same time avoid government domination of the field.

- **Industrial** sales for utilities in the next year will depend upon their ability to help customers modernize facilities, cut unit costs and improve competitive position.

- **Purchasing** in what amounts to a "white sale" market over a long period has some serious implications for the industry. Utilities and manufacturers have some soul-searching to do—early in '59.

- **Political** measles are almost a certainty for the electric power industry in 1959. Although initial attacks will come in Washington, symptoms will be breaking out all over the country.

- **Methods** improvements will have to continue in the coming year if utilities are to hold the line on costs, improve service, increase sales, and generally build confidence in the industry.

- **Metering** advances seem destined to be dominated by random sampling techniques. Because they permit utilities to test more meters with fewer tests, they help cut testing costs.

- **Continuity** sorely needs a numerical measure which will be acceptable to the industry. With such a measure, continuity will take its place as a predictable element of service quality.

• **Distribution** is going underground in many areas, and will continue to do so. Experience shows that customers frequently want it bad enough to pay extra for it.

• **Transmission** in the closing years of the 50's has been in transition. Expect drastic changes in voltages, conductors and tower structures to keep pace with the advances in generation already made.

• **Peaking** capacity will continue to pose problems. The thing to remember is that peaking capacity is not a substitute for base-load capacity, but a means of postponing the installation of it.

MANAGEMENT ▶ **The economy sails into the new year on a freshening breeze**—still dragging a few anchors, but gaining speed. The prospects for a dozen key industries whose progress will determine 1959 kwhr load are presented on **p 87** . . . Arkansas P&L charges "state interference" in appealing a PSC ruling on Little Rock Air Force Base housing . . . Columbus & Southern Ohio Electric and West Penn Power seek rate changes **(p 89)**.

MANUFACTURERS ▶ **Gas-cleaning equipment is being used to cut smokestack emission.** Metals Product Division of Koppers Co has its equipment in Baltimore G&E's Herbert A. Wagner station, and reports good results **(P 70)** . . . A contract for three hydraulic turbines valued at just under $3 million will be awarded to S. Morgan Smith Co by TVA. Turbines are for Wilson Dam . . . General Electric is expanding its microwave products line . . . Delta-Star Division H. K. Porter Co, has scheduled a year-long, nation-wide tour of its new mobile insulator display. Tour will hit cities in which Delta-Star has offices **(p 70)**.

NEW EQUIPMENT ▶ **Switchboard tester functionally tests** a complete metering and relay system . . . Stringing block for ACSR and aerial cables has frame of steel stampings, aluminum alloy sheaves, and bonded neoprene liners as optional equipment . . . Hydraulic derrick features side movement to reduce truck maneuvering **(p 92)**.

SELLING ▶ **The Southeastern Electric Exchange Sales Conference** gave top priority to creative selling, a closer scrutiny of what the competition is doing, and the consumer himself. Georgia Power Co president J. J. McDonough hailed the new EEI National Electrical Living Program, and called for solid support for it if "progress and development for the future is to be a reality" **(p 78)**.

PEOPLE ▶ **C. T. Wanzer has been named chief engineer at Duke Power Co** . . . Dr. L. M. Currie has been elected vp of Babcox & Wilcox in charge of its atomic energy division . . . W. L. Grey has been appointed to the newly created post of vp and general counsel of Anaconda Wire & Cable Co; W. H. Benton, Jr, becomes general manager of mills for the company **(p 96)**.

Photography can cut drafting costs in design work by eliminating the need to duplicate drawings for many jobs. Photographic techniques also simplify the modification of old drawings. For some construction jobs, photographs of scale models take the place of detailed drawings.

Initial costs and future benefits of adopting the metric system in Britain will be studied by the British Association for Advancement of Science. The world-wide potential of nuclear energy and the international market for electrical apparatus prompt the opportunity—even the necessity—to promote international standards. **W. R. Herod, Standardization and Widened Markets, ASA 9th National Conference, Nov 18-20.**

TECHNICAL NOTES

It cannot be assumed that the iron in a transformer core acts as a short-circuited shield during impulse phenomena.

Series connection of mercury-arc rectifiers for a dc transmission line does not substantially improve operating reliability. Furthermore, if one rectifier should not ignite, full direct voltage is applied to it; a higher back voltage appears across the other units in series.

Effect of above-normal loads on equipment, piping, and refractory surfaces should be considered when determining steam station incremental maintenance cost.

Voltage dip will not exceed 1% more for NEMA single-phase air conditioning motors compared with 3-phase units of equal horsepower.

FROM EDITORS IN THE FIELD

Projection viewing of substation one-line diagrams is planned by a southeastern utility in connection with pushbutton supervisory testing. Diagrams will be projected at the push of a button. Positions of equipment supervised will be indicated by lighted lamps for each diagram.

Two-Year Test Shows L-M Flush-Fit Couplings OK on Fibre Conduit

In the fall of 1956, Wisconsin Telephone Company laid a 14-mile run of L-M Permaline Conduit, consisting of six- and eight-duct runs carrying intercity trunk lines.

Unusual Methods Speed Job

To speed up this installation, the contractors used L-M Flush-Fit couplings. These are tapered couplings with the same outside diameter as the conduit itself. They permit one conduit to be laid directly on top of another, doing away with vertical separation and resulting in considerable savings in concrete.

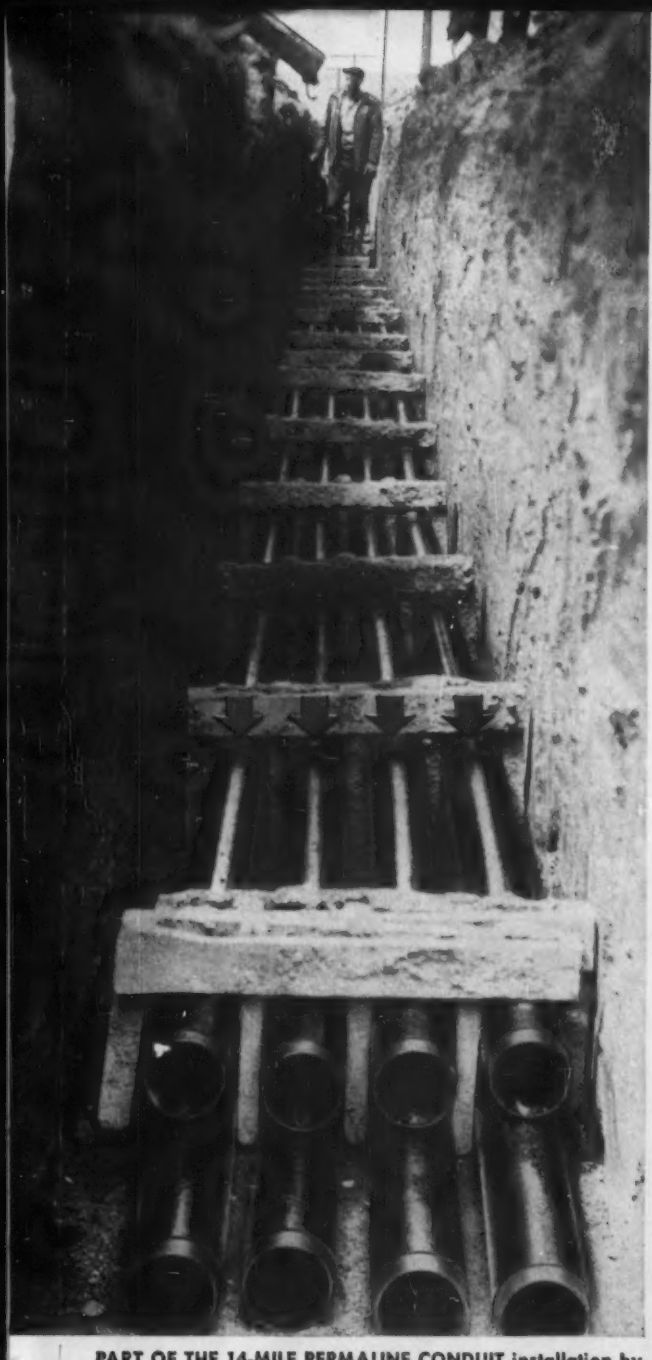
To maintain horizontal separation, wooden forks were used while the concrete envelope was poured. Upon completion of pouring, the forks were removed and reused.

Get Data on Permaline

Permaline Conduit offers many advantages, such as smooth inner bore, consistent high quality, and the Permaline-engineered conduit system with complete procedure, couplings, bends, bell ends, and all other equipment for a fast, efficient installation. If desired, Permaline Conduit is available on skids, in fork-lift bundles, or in steel-strapped slings.

L-M Permaline is offered in sizes 2″ through 6″, in 5, 8, and 10-foot l-o-n-g lengths that save even more time. The most complete line of sizes and lengths. The most complete stocks—in 76 warehouses throughout the country. The largest number of L-M representatives and fibre products specialists to help you engineer your jobs.

Ask the L-M Field Engineer or specialist for free sample of Flush-Fit Coupling and information on this and Permaline Conduit; or write Line Material Industries, Milwaukee 1, Wisconsin, for a copy of L-M's 12-point plan folder and Bulletin UG1A. In Canada: Canadian Line Materials, Ltd., Toronto 13, Ontario.



PART OF THE 14-MILE PERMALINE CONDUIT installation by Milwaukee Division of Wisconsin Telephone Company. The section shown is in Racine County. The installation, which carries principally intercity trunk lines, was laid in six- and eight-duct runs, in five-foot trenches, with four feet of cover. The L-M Flush-Fit couplings (arrows), which are the same outside diameter as the conduit, permitted a faster installation, requiring a minimum of concrete. This Permaline installation, made in 1956, has been completely trouble-free.

THE L-M FLUSH-FIT tapered coupling is formed of light, strong POLYFLEXON plastic. Outside diameter is the same as that of the conduit, so there is no bulge or extra thickness at the joints. On request, L-M Permaline Conduit is shipped with an L-M Flush-Fit coupling attached at one end of each length—without extra charge.

LINE MATERIAL® Industries

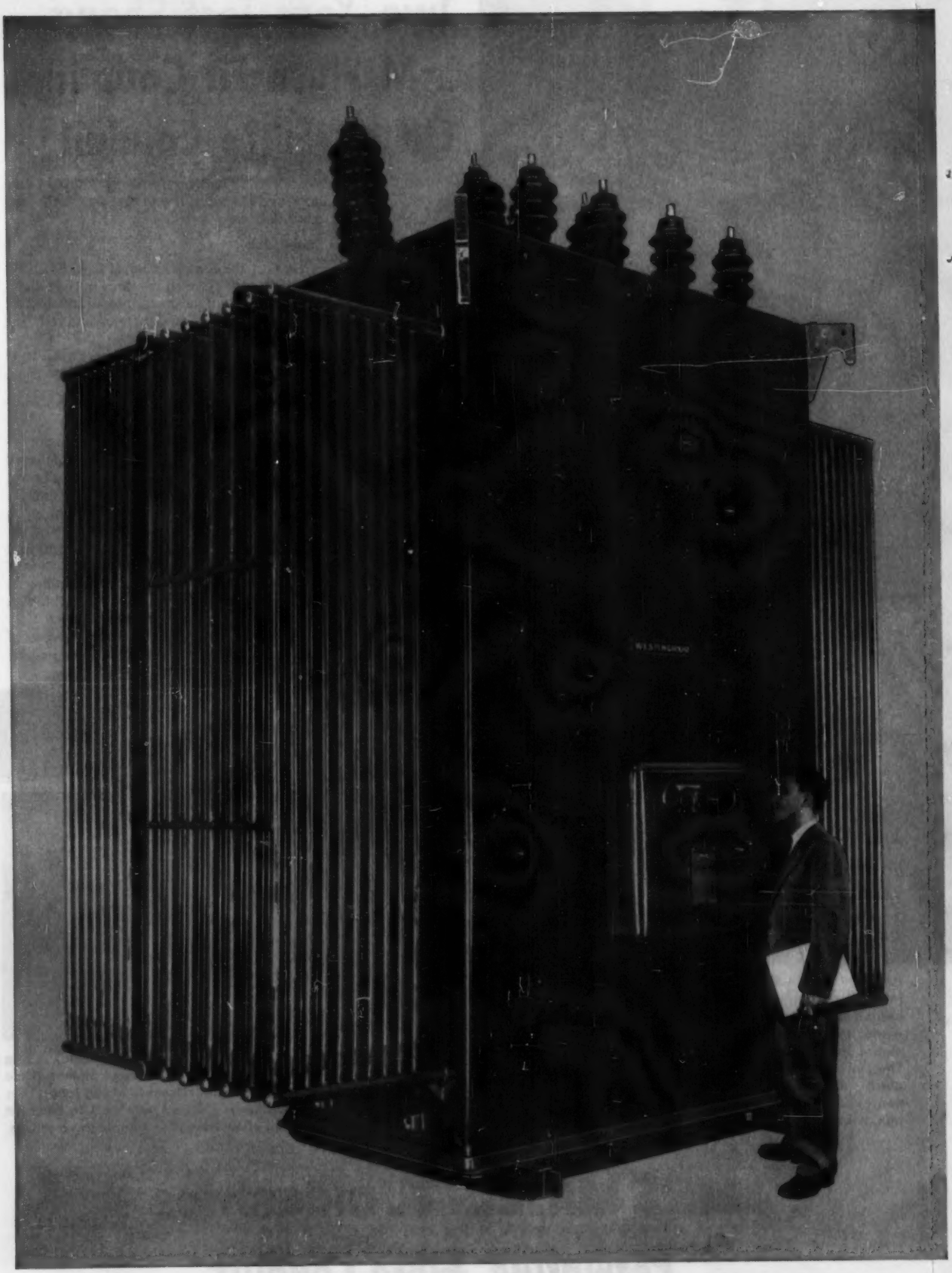
McGRAW-EDISON COMPANY

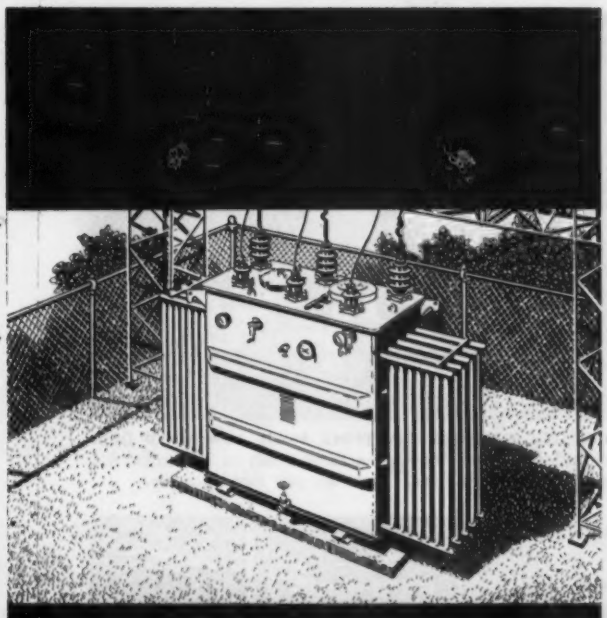
McGRAW EDISON

Permaline Fibre Conduit

378-B

DISTRIBUTION TRANSFORMERS • KYLE RECLOSERS AND OIL SWITCHES • FUSE CUTOUTS AND FUSE LINKS • LIGHTNING ARRESTERS • POWER SWITCHING EQUIPMENT
PACKAGED SUBSTATIONS • CAPACITORS • REGULATORS • OUTDOOR LIGHTING • LINE CONSTRUCTION MATERIALS • PORCELAIN INSULATORS • FIBRE PIPE AND CONDUIT





THROUGH PLOWBACK OF EARNINGS WESTINGHOUSE CONTINUES DEVELOPMENT OF BETTER, QUIETER DESIGNS WITH IMPROVED APPEARANCE

Mr. R. L. Schwab, Manager, Network & Power Transformer Engineering, inspects the new streamlined design transformer, available in ASA ratings 750 through 10,000 kva, 69 kv and below, 3 phase.

New Standardized Substation Transformer Line Promotes Utilities' Customer Relations

"BETTER NEIGHBOR"— IMPROVED APPEARANCE... NEW LOWER SOUND LEVELS

Westinghouse has developed a new line of substation transformers to answer the utilities' requirements for better looking, quieter transformers.

Urban growth — physical and electrical — has meant the location of more and more transformers inside residential areas. Several years ago, Westinghouse foresaw this situation . . . and the unitized substation was born. This was a step in the right direction — but still greater improvements in appearance and sound levels were desirable.

Now, here is a new transformer — attractive even in the center of a populated area. Here's how . . .

Streamlined, rounded tank corners afford better paint adhesion and coverage, stop ugly corrosion before it starts — less maintenance.

External braces are eliminated — no place for debris to collect and start corrosion.

Random scattered location of gauges and valves eliminated — all accessories grouped in a weatherproof, tamperproof enclosure located at eye level. Instruments are easily accessible and can be read through protective window.

Performance-wise, too, the new transformer has been improved:

Improved mechancial strength — to meet severe shock and stresses imposed by modern electrical systems.

One-piece cover and tank is bottom welded — easier untanking if ever required.

Less maintenance — cleaning and repainting are simplified by elimination of external braces.

Lower sound levels — complete line is designed to meet new lower standard sound levels.

Faster delivery possible through complete standardization.

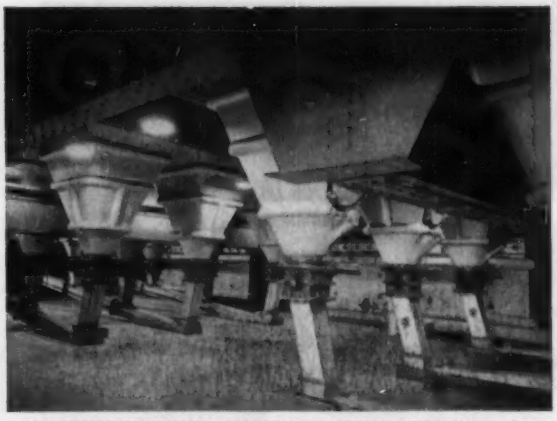
For the full story of this substation transformer, call your Westinghouse representative . . . or write Westinghouse Electric Corporation, P.O. Box 868, Pittsburgh 30, Penna.

J-70682

YOU CAN BE SURE...IF IT'S Westinghouse

WATCH "WESTINGHOUSE LUCILLE BALL-DESI ARNAZ SHOWS" CBS TV MONDAYS

How Commonwealth Edison Turned a Fly Ash Problem Into Profit



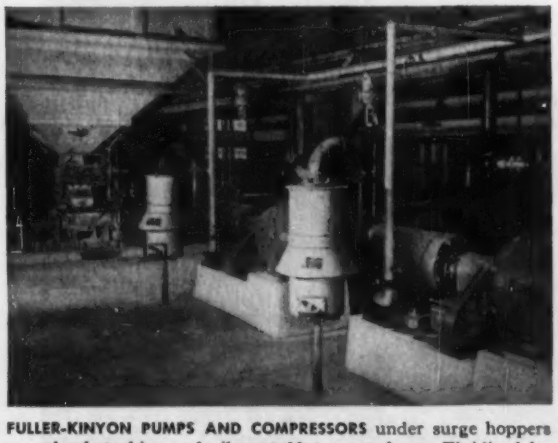
F-H AIRSLIDE FLUIDIZING CONVEYORS ANGLE DOWNWARD from precipitator hoppers, move air-activated ash to 20-ton central surge hoppers under floor. There are few moving parts.

At Commonwealth Edison's State Line Station, about 350 tons of fly ash a day had to be wet down, loaded, and trucked to suitable dumping sites.

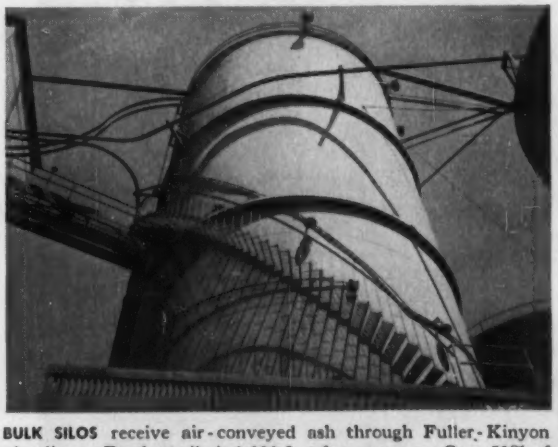
Waste becomes profit. Today, the plant burning a peak load of 5000 tons of coal daily collects dry fly ash automatically in a totally enclosed Fuller-Kinyon system. The ash is conveyed from precipitators to storage bins and silos, where it's sold as a by-product. Manpower: just three men, one at the main control panel and two bagging the ash for sales to local contractors.

Air and gravity do the work. F-H Airslide® conveyors fluidize dry fly ash by a column of low-pressure air for easy movement by gravity to central surge hoppers. Then, a Fuller-Kinyon pump under each hopper drives the ash by air through a five-inch line to storage. The system is practically maintenance-free. There are few moving parts to foul or wear out.

Large and small plants can get the benefits of Fuller-Kinyon fly ash handling. Capacities range from 100 to 8,000 cubic feet an hour. F-H Airslide and Fuller-Kinyon conveying lines can be curved to avoid beams and other obstacles. Low-pressure air provides power inexpensively and installation costs are significantly less than other types of conveying systems. Write for detailed information in Bulletin FF-49-1.



FULLER-KINYON PUMPS AND COMPRESSORS under surge hoppers propel ash to bins and silos at 20 tons an hour. Fluidized by air, the abrasive, 300°F. ash moves without injuring system.



BULK SILOS receive air-conveyed ash through Fuller-Kinyon pipe-lines. Farthest silo is 1,000 feet from pumps. Over 50% of fly ash is bagged and sold as a by-product.

1335
G-203

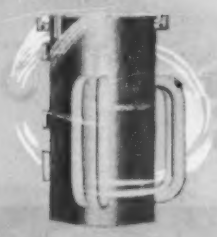
Fuller
pioneers in harnessing AIR

FULLER COMPANY
173 Bridge St., Catasauqua, Pa.
SUBSIDIARY OF GENERAL AMERICAN TRANSPORTATION CORPORATION
Birmingham • Chicago • Kansas City • Los Angeles • New York • San Francisco • Seattle

FULLER COMPANY GENERAL AMERICAN TRADE MARK

FLOW COATING

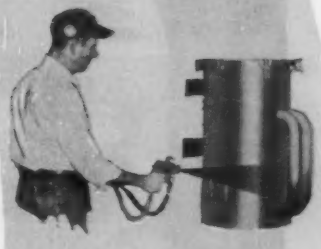
VAPORIZING



DE-GREASING

Protection

HOT SPRAYING



GRIT BLASTING

The tanks for CENTRAL pole type distribution transformers are processed through nine important steps to guarantee maximum protection against corrosion and other destructive agencies. Constant control of these nine steps, plus rigid inspection procedures is your assurance of a superior finish.

Here, in brief, are the steps—just nine more reasons why CENTRAL transformers are preferred throughout the nation:

BAKING

1. Grit Blasting—To remove scale and oxides.
2. De-Greasing—To insure maximum adhesion of paint to metal.
3. Flow Coat Primer—A baking Epoxy applied by generous flow. A base paint that is tough, chemically resistant and a barrier to rust creepage.
4. Vaporizing—Through a vapor chamber where paint volatiles are recirculated constantly to insure uniform coating of all surfaces, corners, crevices, etc.
5. First Baking—In an infra-red oven where time and temperature are precision controlled to insure proper curing.
6. Second Coat, Hot Spray—A thermo-setting acrylic resin coat that is chemical resistant, tough, yet flexible.
7. Second Baking—A repetition of the infra-red baking process.
8. Third Coat, Hot Spray—A baking alkyd-amine paint featuring flexible toughness and a high capacity for retaining gloss.
9. Third Baking—With the same careful attention to insure proper curing.

Throughout the entire painting and baking process, CENTRAL transformer tanks move by endless conveyor. After final baking and inspection, tanks are transferred to another conveyor for movement to assembly area. Controlled production technique as exemplified in this conveyor type painting process is the basis of our statement that—

"From Top to Bottom, Inside and Out, Every Step of the Way, CENTRAL Transformers Are Built for SERVICE."

We Design and Manufacture Quality Transformers, — Nothing Else!

Central

TRANSFORMER CORPORATION

PINE BLUFF, ARKANSAS
Telephone JEfferson 4-5332

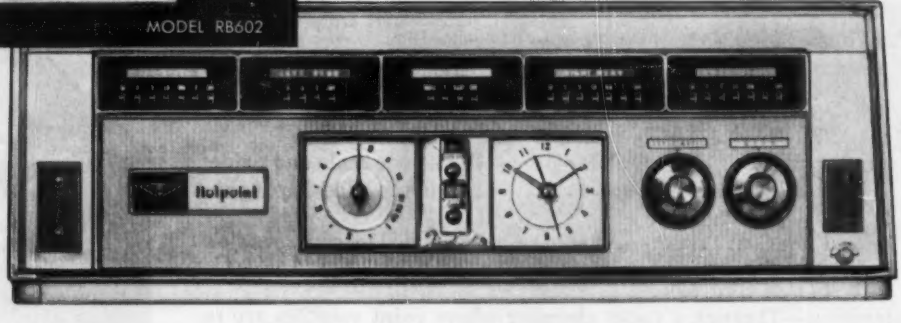
Sales Offices in Principal Cities

NEMA

PUT FULL HOUSEPOWER TO WORK

1959 Hotpoint ELECTRIC RANGES

have the Difference that builds load and revenue... automatically!

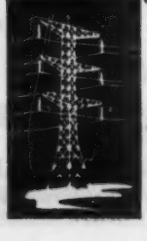


Hotpoint Electric Ranges help you build sales, load and revenue with all of the brilliant advances in quality, styling and completely automatic operation that make up the Hotpoint Difference.

For example, the distinctive new control panel above provides truly automatic cooking. There's an optional Custom Cooker and Server that doubles as a casserole when used in the oven or as a fully automatic utensil when used on the Super-Matic unit. The oven is full width, with a high speed Calrod® bake unit, plus an automatic Rota-Grill rotisserie that easily holds an 18-pound ham.

These imaginative, yet practical advantages are just a few samples of the sale-exciting features offered by the dramatic Hotpoint Difference. Hotpoint Ranges will help you put more POWER in "Housepower"—more LIVING in "Live Better—Electrically!"

LIVE BETTER ELECTRICALLY



LOOK FOR THAT Hotpoint DIFFERENCE

A Division of General Electric Company CHICAGO 44, ILLINOIS

good for another 50 years... it's a Green fan!

We had a phone call the other morning. Nothing unusual about that—people do call us. This caller said he had an old Green fan, and wondered if we'd care to look it over. Figured we might have a buyer for it.

Well, it turned out that this was one of our earliest fans, the sixth fan we made, in fact. Every bit of it, fan, shaft and housing, was designed and made in our plant in 1903. Now, 1903 is so long ago even the name of our town has since been changed from Matteawan to Beacon.

For 55 years this Green fan had been used in a lumber mill for exhausting shavings from a planer. The building in which the fan was housed was torn down early in 1958. Everything but this Green fan had been carted away.

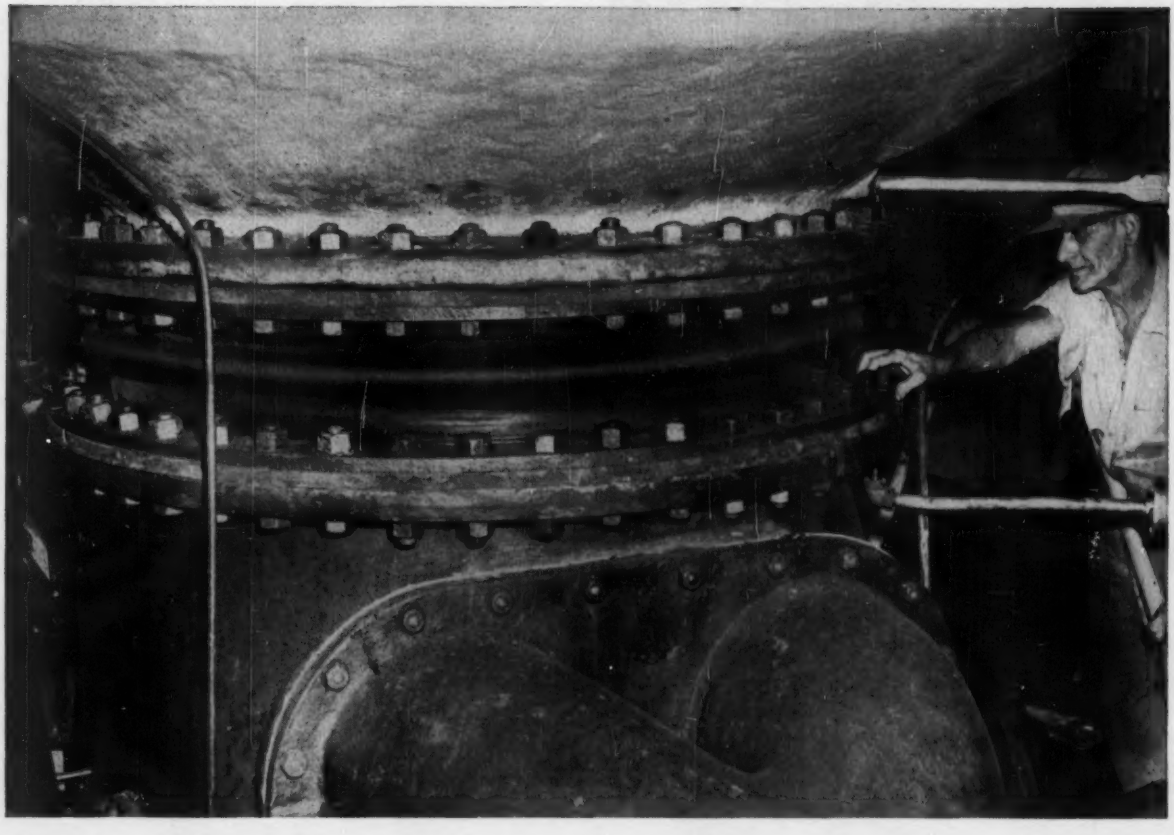
We went over that fan inch by inch, and bought it for ourselves to keep as an example of Green's workmanship.

Know something? It could be started up today, with no repairs, and we feel it would run satisfactorily for another 50 years. Just goes to show when Green builds a fan, well—it's built!

Green

THE GREEN FUEL ECONOMIZER CO., INC. BEACON 3, NEW YORK

US RUBBER EXPANSION JOINTS



For 34 years...

THE OLD JOINT THAT STAYED SUPPLE!

Just how long should a rubber expansion joint keep active? 15 years? 20? 25? Depending on the type of service, any one of these lifetimes would be old age by ordinary standards. But not for U. S. Rubber Expansion Joints.

For instance, the New York, New Haven & Hartford Railroad installed (at its Cos Cob, Conn., power station) one of the first U. S. Expansion Joints ever made. This was in 1924, the first year of Calvin Coolidge's administration. For 34 years, the U. S. Joint gave perfect service, required no maintenance.

When retirement time was finally decided upon, the joint was replaced, of course, by the new U. S. Expansion Joint shown above. Incorporating all the latest developments, this new joint is expected to give a performance worthy of its predecessor.

34 years on a job is just one of the many, many service records chalked up by U. S. Expansion Joints in power stations throughout the world. "U. S." was the first to make rubber expansion joints, and has always been the most reliable source of supply.

When you think of rubber, think of your "U. S." Distributor. He's your best on-the-spot source of technical aid, quick delivery and quality industrial rubber products.

NOTE: We believe this is one of the oldest rubber expansion joint installations in existence. If you know of, and can authenticate, an older one, we'd like to hear about it, and we'll send you a $100 U. S. Savings Bond.

US RUBBER

Mechanical Goods Division

United States Rubber

WORLD'S LARGEST MANUFACTURER OF INDUSTRIAL RUBBER PRODUCTS

Rockefeller Center, New York 20, N.Y. In Canada: Dominion Rubber Company, Ltd.

Sold only through Insulator Manufacturers

Proven rugged by long service in utility systems throughout the world! Cast from high strength, non-corrosive aluminum alloy. Light weight reduces conductor damage . . . flared mouth design prevents chafing. Engineered for minimum hysteresis and eddy current losses. Clevis pin locked against rotation. Speed cotter key facilitates maintenance while energized.

ANDERSON ELECTRIC CORPORATION • BIRMINGHAM 1, ALABAMA
Export Representative: International Standard Electric Corporation
50 Church Street, New York 7, N.Y.

ANDERSON ELECTRIC

Research / Quality / Performance / in Aluminum and Bronze Products

Aluminum and Bronze Power Connectors • Clamps • Fittings • Accessories for SUBSTATION • TRANSMISSION • DISTRIBUTION

New SHELTERFOR-M service area...

For modern integrated substation design

Now Westinghouse provides, for the first time, one integral structure to house switchgear, operating aisle, maintenance and storage area. Costly, space-consuming outbuildings are eliminated. All the substation structures are consolidated into one low, compact group that is easily landscaped to make it a good neighbor in crowded suburban developments.

Standard three-foot panels provide flexibility for expansion. Service Area is readily erected by two men with standard tools in a few hours.

Control batteries can be located near breakers to eliminate expensive conduit runs and reduce voltage drops associated with long runs.

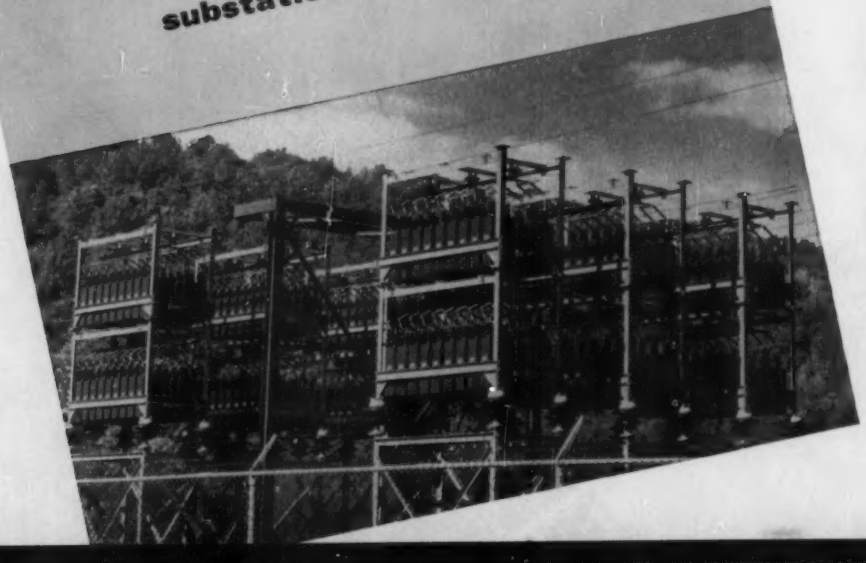
Call your Westinghouse Sales Engineer today to learn about additional ways you can save in your substation designs. Or, write Westinghouse Electric Corporation, P.O. Box 868, Pittsburgh 30, Pa. J-60943

YOU CAN BE SURE...IF IT'S Westinghouse

WATCH "WESTINGHOUSE LUCILLE BALL-DESI ARNAZ SHOWS" CBS TV MONDAYS

As simple

Factory-assembled VAREX equipments make neat, low-cost substation installations



as building with blocks

Shown under construction are two 5400-KVAR banks of O-B Varex capacitors. Each of the 12 blocks of 900 KVAR was assembled at the O-B factory, wired, individually fused and sent to the customer ready to install, together with elevating substructures.

To assure alignment of bolt holes, racks are jig assembled at the O-B factory. The value of this care was evident in the installation at the left. Construction of the two banks started shortly after 9 a.m., was completed by 3:30 p.m., by a four-man crew. More important than speed of installation was convenience. The large units fitted together as easily as a child's building blocks.

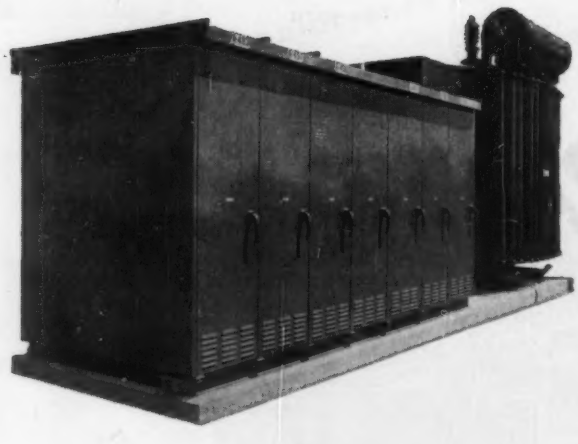
Installations like this one are typical of the various types of equipments that O-B now furnishes to capacitor users. You can get O-B equipments switched or unswitched, for pole-top or substation installation, wired or unwired, in a choice of configurations. This gives you literally thousands of combinations from which to choose.

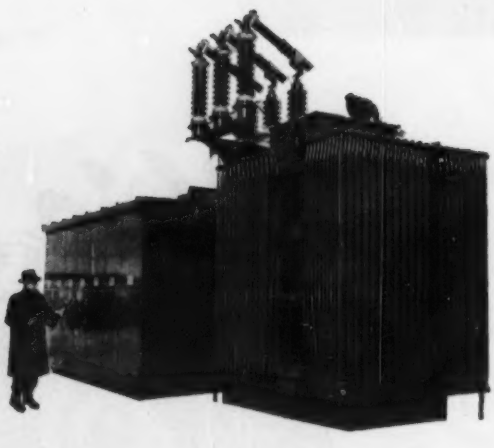
Your O-B representative would certainly appreciate the opportunity to discuss your next capacitor equipment order with you.

OHIO BRASS COMPANY, MANSFIELD, OHIO

4965-H

Ohio Brass



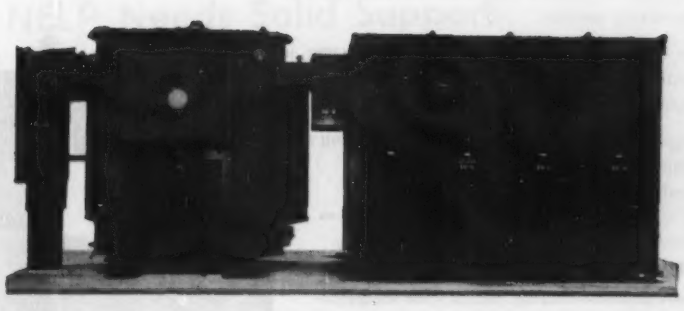


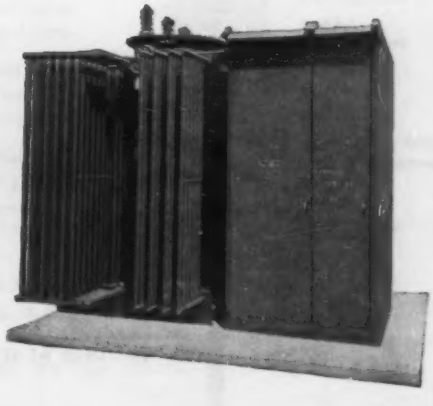
Winning Value Recognition All Over the Map

Look around you today. You will see more I-T-E PRIMARY UNIT SUBSTATIONS going into service everywhere—in places where orders are placed after careful evaluation of several different makes. The growing trend toward I-T-E substations reflects the response of shrewd buyers to I-T-E's standing policy of giving more value for no more money. I-T-E engineers work with you in the planning stage . . . custom design the station to meet your particular requirements . . . skillfully arrange I-T-E's quality components into an efficient unit that gives you the maximum value for the minimum investment . . . make deliveries to meet your construction schedules. Make I-T-E your dependable, single source for complete PRIMARY UNIT SUBSTATIONS.

For information, write I-T-E Circuit Breaker Company, Switchgear Division, 19th & Hamilton Sts., Philadelphia 30, Pa. In Canada, Eastern Power Devices Ltd., Port Credit, Ontario.

I-T-E CIRCUIT BREAKER COMPANY
PHILADELPHIA, PENNSYLVANIA





Q.E.D.

Copper Loss Test

Ratio Test

Impulse Test

Induced Potential Test

Applied Potential Test

Core Loss Test

Sound Test

CSP Breaker Test (when applicable)

Every Moloney Distribution Transformer is proven by rigorous, automatic testing.

After a transformer has passed through Moloney's automatic test area, the users can be assured that it will provide years of efficient, dependable service.

Each Moloney transformer must pass copper loss, ratio, impulse, induced potential, applied potential, core loss and sound level tests.

Take advantage of the modern design, manufacturing and testing procedures developed by Moloney. Specify Moloney Transformers . . . All Along the Line.

ME 50-20

MOLONEY ELECTRIC COMPANY

Manufacturers of Transformers for Utilities, Industry, and Electronic Applications

FACTORIES AT ST. LOUIS 20, MO. AND TORONTO, ONT., CANADA

Teamwork, Long-Term Contracts Help Solve Fuel Needs

Long-term contracts between utilities, coal producers, and railroads hold for each industry the promise of future prosperity. Utilities have become the coal industry's best customer and coal hauling is the backbone of many railroads' business. All three have a vital interest in keeping coal the most economical source of electric energy.

Leaders of the three industries recently saw an impressive example of such cooperation in the Clinch River Valley of Virginia. Here Appalachian Power Co has about completed its newest and largest generating station at the edge of a vast coal field. Cost of the 450-Mw power plant was said to be "something over $60 million." But at its dedication, Sporn admitted this project could not have been created without Clinchfield Coal Co's reserves and mining know-how and Norfolk and Western Railway's ability to haul it.

The coal company's participation involves 1.3 million tons per year from the new Moss No. 3 mine, hailed by Pittston Co's Board Chairman J. P. Routh as an historic example of mechanization in the coal industry, and its companion cleaning plant which automatically washes, dries, and sizes 25,000 tons per day. The railroad's contribution was an 8,140-ft tunnel and 31.5 miles of new trackage to haul the coal from Moss No. 3 to the power plant. Coal and rail facilities together will total in excess of $85 million.

Routh cited the new complex as proof that "bituminous coal intends to be competitive with oil, natural gas, and atomic energy at all times." But if utilities want to keep coal competitive in the face of soaring demands, "they should place long-term contracts at fair prices so producers can obtain the financing to build the mines and assure an adequate supply of high grade coal."

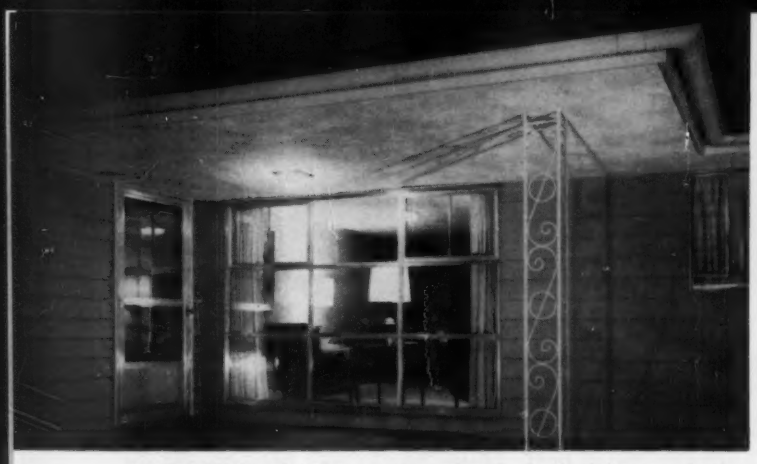
Routh urged the railroads to join the team and haul the coal "by contract or special trainload rates or lose a good part of this very lucrative revenue."

Long-term contracts are the framework of cooperation between these three great industries. Such contracts enable each industry to plan its operation intelligently and finance the plan which gives best economy. Only thus can they keep coal the most economical source of electric energy.

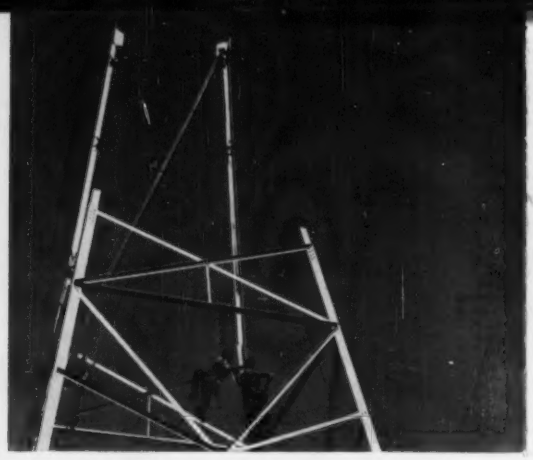
NELP Needs Solid Support

Edison Electric Institute unveiled its "National Electrical Living Program" recently in New York. The program, which has a budget of approximately $2.5 million and is backed by 126 utilities, has one basic objective: To sell more electric appliances, wiring, lighting, and kilowatt hours in the new and existing homes in America.

The broad national market development program is one in which every detail has been carefully considered and planned. It is also, in the words of one EEI spokesman, "A program of national leadership." But it will mean little—very little indeed—unless it gets solid support from electric utilities at the LOCAL level. This support can change it from a program with great potential to one of great accomplishment. We trust electric utilities will see to it that NELP becomes just that.



ALL-ELECTRIC LIVING program, already backed by two-thirds of EEI member companies, will aim for greater domestic use



CONSTRUCTION SPENDING for industry hit high of $3.8 billion in 1958, an increase of $100 million

Industry's Encouraging Stability and

For some, the term "stability" conjures a picture of a doddering, unimaginative entity, one well settled in a comfortable rut. Jack Corette, in his year-end review of the electric utility industry, has achieved the distinction of embracing stability in a way that convinces all but the most myopic that it can go hand-in-hand with progress.

The Edison Electric Institute president, with a recession framework on which he proves his point, sums up the industry's new records for new capacity, residential use, revenues and construction spending.

Corette, Montana Power Co president since 1952, released his 1958 review via EEI on Dec. 12. About 2,200 copies have gone out to newspapers, magazines, wire services, writers and member companies.

Here's what the 48-year-old EEI chief says:

Outstanding among the encouraging influences during the recession were the stability and progress of the electric utility industry.

While industrial production declined over 19 points, electric production more than held its own. Generation by all components in the industry totalled 641-billion kwhr, an increase of 10-billion kwhr over 1957. When combined output of railway and industrial plants is added, total U. S. production reached 721 billion kwhr. This exceeds last year's figure by 5 billion.

The industry's built-in stabilizer —constantly increasing residential use—brought a high of 3,385 kwhr average annual use per domestic customer in 1958. This is an increase of 211 kwhr over last year. The industry expects residential demand to keep to its current trend, and uses of from 6,000 to 8,000 kwhr per domestic consumer per year by 1968 is not an idle speculation. Another million customers were added, bringing the year-end total to 56.2 million.

In 1958 investor-owned electric companies spent $3.8 billion on new plant and equipment, an increase of $100 million over the 1957 record high. Electric plant investment equalled 12.5%, or one-eighth, of all business investment in 1958.

CORETTE: All looks well but tax load

Fourteen-million kw of new generating equipment came on the line in 1958, making it the largest annual increase in capability in the industry's history. Of this, 11.5-million kw were added by investor-owned companies. The additions increased America's generating capability to 149.5-million kw at the end of 1958.

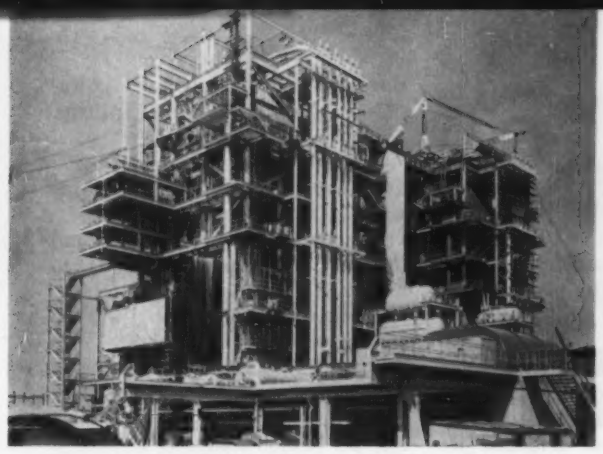
Construction expenditures by electric companies in 1959 are expected to equal the $3.8 billion expended in 1958. About 13.6-million kw of capability will be brought into service in 1959; 10.2-million by the companies. In ten years the industry is expected to be adding over 20-million kw a year just to keep abreast of a consumer demand estimated at 1,300-billion kwhr for the year 1968.

Earnings as a whole were better than in 1957. Electric companies gross revenues in 1958 were $8,416 million; in 1957, $8,054 million. Net income was $1,534 million in 1958 vs $1,427 million in 1957. There are presently nearly 4-million electric utility company investors.

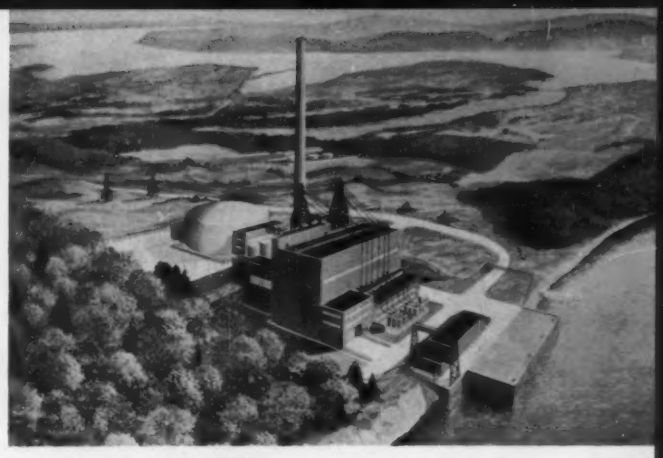
Wages Rose Nearly 5%

During the business decline, employee compensation in all industries fell about 2%. But electric utility wages and salaries ran up from $1,426 million in 1957 to $1,490 million in 1958, an increase of almost 5%.

Fuel, another important expense, cost power companies $1,365 million in 1958. This was a 1.2% decrease from 1957 when falling water sources generated 20.6% of the total vs about 22.1% in 1958.



GENERATING ADDITIONS like Southern California Edison's Huntington Beach Station totaled 14-million kw in '58



129 POWER COMPANIES are now participating in 28 nuclear projects. Indian Point, above, is Con Ed undertaking

Progress Cited in Corette's '58 Recap

Investor-owned electric companies will pay about $2 billion in taxes for 1958, up nearly $150 million over 1957. Considering the plight of government finances, it appears not only discriminatory but irresponsible to continue the preferred tax position of government-owned and financed projects.

Domestic Kwhr Price Declines

Average revenue per kwhr sold to domestic customers maintained its steady decline. In 1958 average revenue was 2.52¢, down from 2.56¢ the previous year. Latest figures show that of each $1 spent by consumers, only 1.32¢ went for electricity, whereas 2.13¢ were spent for tobacco, 3¢ for gasoline and 5.18¢ for recreation.

Recognition by regulatory commissions of the inroads of inflation has continued to be recognized. From 1946 through the first 11 months of 1958, there were 542 applications for rate increases, involving 220 companies. Of the 542 applications, 476 were granted, 32 are pending, 13 were withdrawn and 21 denied. The 1958 record to Dec. 1 shows 30 increases were granted, 27 applications are pending, and one was denied.

EEI's board of directors approved in 1958 a National Electrical Living Program aimed at increasing home use of electricity. Approximately two-thirds of the institute's member companies are already in on this enterprise with some $2.5-million pledged for the program, which will be launched during National Electrical Week.

The industry in 1958 continued its efforts to hasten the day of economic electricity from nuclear fuels. One significant step was the formation in November of High Temperature Reactor Development Associates, Inc. Composed of Philadelphia Electric Co and more than 50 other power companies, HTRDA has offered to develop and build a high-temperature, gas-cooled nuclear power plant which may provide a short cut to the goal of economic nuclear power. Philadelphia Electric and HTRDA will spend $24.5 million to construct the 40,000-kw prototype plant.

One-hundred and twenty-nine electric companies were participating in one or more of 28 nuclear power research, development and construction projects or studies at the end of 1958. An expanding program, in cooperation with manufacturers and AEC, at present includes 16 nuclear power plant construction projects involving a total utility company investment of more than $540 million. There are also 12 other nuclear research, development and study projects under way, including a multi-million dollar project on controlled thermonuclear reaction. Of the 16 projects, three are in operation, six are either under construction or contract, and seven are in planning stages.

U. S. Increasing Lead Over Soviet

In spite of Russian claims, Soviet total generating capacity is less than the total of new capacity installed in 1958 and to be installed in the next three years by the U. S. electric industry. Total U.S.S.R. installed capacity was reportedly 48.3-million kw at the end of 1957. From 1958 through 1961, the U. S. will install more than 50-million kw.

Premier Khrushchev says annual output of power is expected to reach 500 to 520-billion kwhr in 1965. By the same year, U. S. output is expected to reach 1.25-trillion kwhr annually. In generating capacity, the Soviet Union has announced plans for adding 60-million kw by 1965. The total to be reached by that year would be 108-million kw for Russia, if their expectations are met. This compares with an estimated 250-million kw which the U. S. will have installed by 1965.

EEI Has Big Year, Too

Handsome new headquarters and a streamlined administrative committee structure were among highlights of an active 1958 for EEI. Last April the association staff moved from the mid-town Manhattan offices next to Grand Central to a full floor at 750 Third Ave. In September the EEI board endorsed the formation of a division comprised of a new Management Practices Committee and committees on employee, investor and customer relations.

Atomic Progress

- AEC selects more reactor concept study proposals
- Two transportable reactor proposals are firmed up

Proposals from three firms for study of new reactor concepts have been selected by AEC as bases for contract negotiations. Each of the studies will cost about $150,000.

American Radiator & Standard Sanitary Corp will study a mercury cooled fast breeder. General Electric Co will explore a modified sodium graphite reactor with modules containing fuel and coolant. Babcock & Wilcox will study a gas suspension coolant reactor.

Earlier this month, AEC accepted similar proposals from three other firms which, in association with subcontractors, will explore concepts to determine designs leading to the most economical stations for the three types.

Proposals came from Stone & Webster Engineering Corp on a pressurized water study; Ebasco Services, Inc, for a boiling water study; and Bechtel Corp for an organic cooled study. Target date for start of construction of each type is July, 1960.

In November, Sargent & Lundy was selected from among 15 proposals to AEC for a design study of a heavy water moderated reactor capable of using either natural or slightly enriched uranium as fuel. Nuclear Development Corp will serve as subcontractor.

Thirty-nine firms have submitted 107 proposals for participation in AEC's fuel cycle program.

Companies with acceptable proposals will be provided with hot cell facilities, irradiation space in test reactors, and arrangements for operation use in commercial-size power reactors.

• The Air Force will install and test its transportable power and heat reactor at Sundance, Wyo., where an Air Defense Command Aircraft control and warning station will be constructed in 1959. AEC and the Air Force invited proposals in October for the design development, fabrication, installation and test operation of the plant.

The pressurized water reactor will produce 1,000 kw (some 2,000 kw of heat). Factory-assembled modules, or units, of the plant can be air-transported to a site and rapidly erected.

Meanwhile, Combustion Engineering, Inc, is the AEC's tentative choice for operation of another transportable reactor intended for military use, the Argonne low power reactor at the National Reactor Testing Station in Idaho.

The firm's contract proposal was among 13 received in response to a commision invitation.

The boiling water reactor, which produces 200 kw (400 kw of space heat), achieved criticality last August. Operation, plus further research and development by Combustion Engineering, are expected to lead to cost reduction, better component packaging and design modifications that will provide increased power output.

• Duquesne Light Co and AEC are joining to conduct a training school at Shippingport for supervisory personnel of domestic and foreign organizations planning to build and operate power reactors.

Twenty-five participants will be enrolled every three months for a six-month training course which will include lectures and practical plant work. The first class will start Jan. 5. Tuition charge is $2,000.

• AEC is moving to encourage more research toward use of plutonium or U-233 as power reactor fuel. The commission announced plutonium will be available at $12 per gram base charge, and U-233 at $15 per gram. Private companies or individuals in the U. S. may lease the materials for 4% of the base charge, while they may be either sold or leased under the same terms to foreign governments having agreements for cooperation with the U. S.

Rates and Regulation

- Good reaction follows 'model' law plan for quick hikes

Favorable reaction has been reported to a proposal that the District of Columbia rework its 45-year-old Public Utilities Act to serve as a "model" law for states wanting to update antiquated statutes.

D. C. Commissioner Harold A. Kertz said several state commissioners and staff members commented favorably on his proposal in private conversations at the recent meeting of the National Association of Railroad and Utilities Commissioners in Phoenix.

Under the Kertz proposal (EW, Nov. 3 p 45), the "model" law would empower the D. C. Public Utilities Commission to grant rate hikes quickly after a brief hearing. It also would define "rate base" and other terms more precisely, and set forth speedier but adequate procedure before the commission.

Kertz proposed the "model" law at a meeting of the D. C. Bar Association's 20-man Public Utilities Committee, headed by Oscar Berry, Washington Gas Co. Kertz asked the committee to consider drafting a shortened procedure to expedite regulation.

He also indicated he was requesting $10,000 in the next fiscal budget for a thorough study of the old law to be followed with recommended improvements.

Meanwhile the committee met and reported to the Bar Association's board that it endorses such a study, but that the committee itself should not undertake to work out shortened procedure. Board adoption of the recommendation is anticipated.

It is believed the committee—with utility lawyers as a minority element—felt that such a project would be a drag because of extra load it would impose on the members.

The Bureau of the Budget, however, has approved the commission's $10,000 appropriation request for congressional consideration next session.

U.S. Power Picture

- Nominees for Edison Award chosen by review committee
- Neuberger proposes amendments to corporation bill

Citations have been made to five power companies for 1958 accomplishments deemed of most importance to the electric industry and to the public. The five utilities have received invitations to submit presentations for the Edison Award, the industry's top honor, previous years known as the Coffin Award.

Picked from a field of 29 nominees, the five companies and their accomplishments are:

Alabama Power Co—"Exceptional business statesmanship in conceiving a large-scale water resources development program on the Coosa and Warrior rivers, and aggressive action in mobilizing public opinion to obtain necessary federal approval . . ."

Arizona Public Service Co—"Adoption of, and complete changeover to, electronic data processing on a large scale for handling all accounting procedures and system operating problems, and pioneering a constructive computer research program . . ."

Idaho Power Co—"Outstanding and successful efforts, despite tremendous opposition, to develop large-scale power resources in the Hells Canyon section of the Snake River as a private, tax-paying enterprise . . ."

Pacific Gas & Electric Co—"Enlightened leadership, pioneering engineering accomplishments and a progressive public education program all directed toward advancing nuclear power for economical commercial use without tax subsidies or governmental assistance . . ."

Philadelphia Electric Co—Outstanding achievement in planning, organizing, and executing a disaster plan for restoration of service following severe storms; and consistent contribution to advancement of industry technology in generation, transmission, distribution and load building."

The award will be announced and presented at the Edison Electric Institute annual convention in April.

Duquesne Light Co received last year's Award for its role in the Shippingport atom plant.

● Sen Richard L. Neuberger (D-Ore.) will propose three major amendments in his Columbia River Regional Corporation bill as result of suggestions made during Northwest hearings on the measure (EW, Dec. 22 p 36).

Before the revised measure is introduced in the Senate next year he will recommend that it will provide, he said:

1. That the general manager of the corporation be appointed by the five-member board of directors, rather than by the President, as previously provided in the bill.

Neuberger said it was felt in the hearings and expressed by witnesses as far apart on some other matters as Gus Norwood of the Northwest Public Power Association, and Kinsey M. Robinson of Washington Water Power Co, "that prestige and influence of the board would be imperiled if the general manager was responsible directly to the President rather than to the board."

2. That the bill should be clarified to make it emphatic that the regional corporation isn't authorized to own, build or condemn hydroelectric power dams.

3. That terms of the bill pertaining to cooperation with non-federal power projects should be made more flexible and less rigid and demanding.

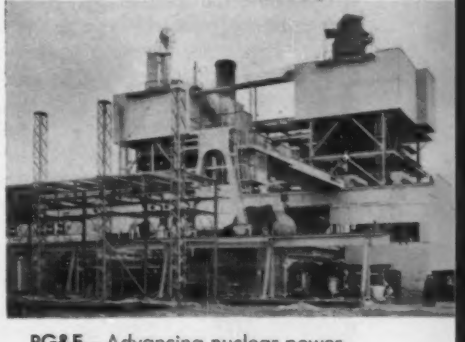
The present language would permit the corporation to cooperate with a non-federal undertaking only when terms are "as favorable to the United States as if the project were constructed by the federal government."

Neuberger said this provision could be unfair to both private and public utility systems and suggested a provision allowing a percentage differential of costs on such projects over straight federal expenses.

APC—Business statesmanship

APSC—Changeover and pioneering

IPC—Successful Hells Canyon efforts



PG&E—Advancing nuclear power

PEC—Storm disaster plan

OUTLOOK FOR '59

Trends

Staff report highlights trends in major

A host of exciting and crucial challenges face the men who will be directing the nation's electric utility industry in 1959. These men will be operating systems with a generating capacity some 11% greater than at the beginning of 1958. They will be selling in an economy that appears to be heading toward another boom. They will be serving customers which demand reliability as persistently as they demand greater energy availability.

As utility executives strive to meet the demanding energy and service requirements, they will run into technical barriers that must be removed and political pressures that must be dealt with. There also is the constant inflation and labor demands that must be faced in an arena restricted by utility regulation.

On these and the following nine pages, the editors of Electrical World bring into sharp focus the major problem areas and spotlight the trends that seem certain to influence the major decisions that industry men will be making during the coming year.

Our purpose in this searching preview is to bring into perspective the significant developments of the

Research Quest for New Knowledge

Cooperative projects are hallmark as utilities quicken pace, expand activity

What to do about research is virtually the number-one challenge to utility industry leadership today. Among electrical manufacturers, who annually spend 6% of sales income or about $1.6 billion for research and development, it has always been linked with growth and survival. But this essential relationship has not been as apparent to utility management, in past years as it is today, and will remain in the future.

Cooperative participation in reactor development has become the hallmark of the industry's growing recognition of research as a prerequisite of survival. Here, as in other research and development areas, the pace of utility activity has quickened and expanded. Where two years ago there were 968 individual research projects being conducted among 45% of the 175 member companies of the Edison Electric Institute, today there are an estimated 1,200 projects.

From an overall viewpoint, however, utility research activity today shows serious need for better coordination of individual company efforts. Coordination is needed to avoid overlapping activities and to expand and project utility research into new fields. Today an estimated 25% of companies working on research are engaged in similar projects. Moreover about 200 projects now being researched by utilities could profitably be extended in scope, according to preliminary results of industry surveys.

Where research has been coordinated by professional institutes and industry associations, individual research projects are advancing on a sound basis. This year saw the successful conclusion of EEI sponsored research in aluminum connectors. Cooperative research in soil thermal resistivity at Princeton, under AIEE direction with IPCEA and utility groups participating, is in its final phases. Next year will also see the beginning of an extensive AEIC program of tests on experimental 345-kv cable designs provided by cooperating cable manufacturers. This group of private power companies (AEIC) is also engaged in researching water pollution, stack-gas emission and load research, among other things. One of the most comprehensive researches into the characteristics of appliances loads was completed this year by three Texas utilities as a guide to future sales effort.

In spite of this proud record of progress, there are many other areas today where the utility industry needs answers to problems that can only be provided through carefully organized research.

In generation the incremental cost of higher steam pressure and temperature is not being offset by thermal gains. A metallurgical barrier blocks use of low-alloy ferric materials for turbine rotors, shells and piping above 1050 F. Austinitic steel that has adequate high temperature strength is costly and hard to fabricate. So unless research can come up with new basic knowledge, not now at hand, the industry may have to forego further temperature increase, as a source of turbine performance, and satisfy itself with a 1 to 1½% reduction in fuel consumption per kilowatt hour during the next decade. Also needed is proof of the promise inherent in the gas-turbine, pressurized-boiler combination, now waiting on research in goal-fired gas turbines to show the way. Stack-gas problems and water pollution difficulties also remain unsolved.

This year saw major research projects launched in the U.S. and Canada to explore EHV transmission

in 11 Key Areas

problem areas that will influence utility management decisions during coming year

past year and relate them to the problems that must be faced during the year ahead.

Where possible, we have gone further to suggest specific courses of action that we believe must be taken if the industry is to retain its dominant position in the economy and continue to make its vital contribution to the American standard of living. In every case, we have attempted to offer general policy recommendations for your thoughtful consideration.

For instance, we are quite serious about the urgent need for more positive industry action in the field of nuclear power. We take this position with full knowledge of the admirable and constructive, but still defensive measures already taken.

We have even deigned to discuss underground distribution, for we believe it a problem that must be faced. Transmission design is another area that contains pressing requirements still to be met. The summer peaking problem merits continuing attention.

But even as we note the accomplishments of the present year, we turn to the challenges for the year ahead.

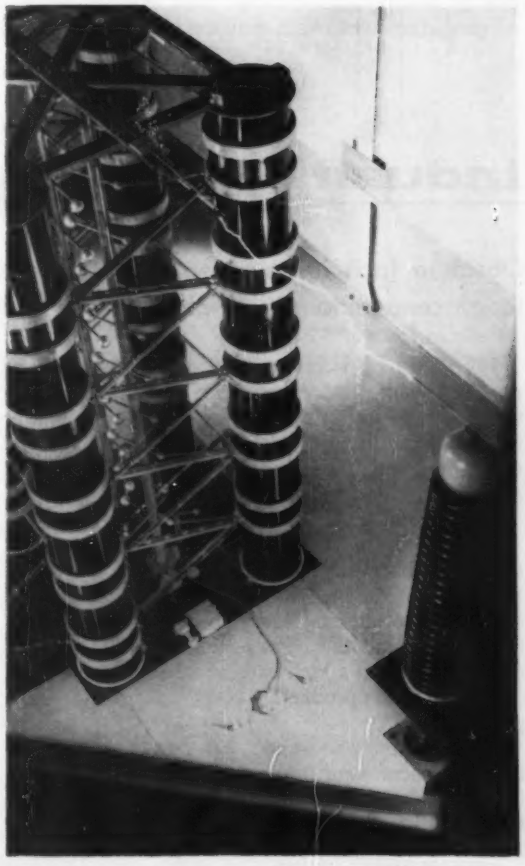
Is Number-One Challenge

unknowns in the 460 to 750 kv range, now attracting attention both here and abroad. U.S. cable manufacturers are gearing-up today for sorely-needed research is the area of extra high-voltage cable dielectrics. Need is urgent for new insulating materials that will extend power cable capabilities beyond present thermal barriers. Dielectric loss and charging reactive power requirements of presently foreseeable EHV cable designs, soon to be tested at Cornell University, impose specific limitations on permissible continuous lengths. The limitations of paper insulation for EHV cable are much better defined today than either the potentialities of plastics of the practicabilities of underground dc transmission for U.S. conditions.

Distribution's biggest dilemma remains to find a distribution system pattern capable of meeting the high standards of reliability imposed by electric living, at a cost consistent with promotional rates. Meanwhile failure to find a meaningful numerical measure of distribution reliability leaves designers without the tools to compare approaches that might prove practical. Resolution of the great debate over higher secondary voltage is as far away as it was two years ago. A committee report is anticipated in 1959 that could point a direction, but probably will not in the opinion of informed people.

In the area of system operation, the growing sensitivity of system loads to weather conditions recommends research in load forcasting methods as the public turns to electricity for year-round comfort.

Added up it's apparent that the utility industry today realizes its research responsibilities and has accepted them. The task now is to decide what and how much more to do; and then to organize to do it on a coordinated basis.



RESEARCH not only in areas of electrical technology but in sales and operation too hold key to utility progress

Atomic

Industry Must Offer

Timely, imaginative plan for development is way to avoid government domination

In 1959 the utility industry must support collectively a positive program for the development of nuclear power.

Last year we made a similar statement indicating that the big decision for utilities in the nuclear field must deal with policy rather than economics or engineering. Our prediction was true—at least to the extent that nothing unforeseen occurred in the economic or engineering field. Our knowledge of course was increased by the experience obtained from several power reactors operating in this country but even the smooth operation of these reactors fortified, if anything, our claims about that predominance of policy decisions in this field for several years to come. For their operation indicated that we cannot expect any major breakthroughs. Progress will be positive and steady—but it will be slow.

Our predictions were perhaps faulty because there was no major change in our nation's nuclear policy as we had predicted. But it appeared that the policy change was postponed rather than rejected because of procedure difficulties between the AEC and the JCAE. These differences were resolved and the Joint Committee on Atomic Energy took the lead by forcing the Atomic Energy Commission to arrange full-scale construction of a reactor concept AEC experts did not seek, the high-temperature gas-cooled reactor. If private enterprise would not build the plant, said the JCAE, AEC must.

Following basic policy, AEC first appealed to the industry to pick up the project. Responding, over 50 utilities, in a cliff-hanging climax to agonizing internal negotiations, filed a proposal just under the deadline. If accepted, the plant will be built with federal aid only for R&D.

Significantly, though, the industry was caught off balance by the JCAE play, and could be kept off balance. Bolstered toward the left by the elections, JCAE may make this the beginning of a series of calls for full-scale construction of a wide spectrum of untried concepts, with the same proviso: If private industry won't build, the AEC must do so with federal funds.

Thus the industry may find itself fighting grass-fires; as quickly as support is found to pick up a new concept, another may be called. Finally, the JCAE must attain the goal set by its public-power-minded members—plants built entirely at government ex-

Industrial

Modernization to Cut

Obsolete facilities are replaced to meet tough competition; Kwhr plays profits role

For industrial power men, 1958 was a pivotal and prophetic year. Hidden by the poor business conditions were decisive changes in industry's thinking that promised to alter the entire nation's economy in the coming years. Behind the changes is one idea: a determination to cope with continually rising production costs—now.

One of the most significant changes is the shift in how industry is spending its money. Since the Korean War, the biggest chunk of capital investment has gone into building new facilities. By 1957, most industries found themselves with abundant productive capacity, but a high percentage of obsolete facilities, where high production costs were sapping company profits.

This year the tide turned. More than half of capital investment went into modernizing existing facilities. And the trend will be accentuated, with diminishing portions going into new plants and expansions in the immediate future.

Typical is the steel industry. With a large portion of its total capacity idle, it is spending millions to modernize and automate existing facilities—and showing significant gains in productivity. In the period ahead, over 80% of capital expenditures will go into modernization, as opposed to expansion and new construction.

What does all this mean to the industrial power man, the plant electrical engineer and the utility power sales engineer who works with him? Converting batch operations into continuous processes and substituting electrically powered conveyors for manual materials handling will lead to bigger loads and a heavier responsibility for keeping the production wheels rolling. Because automated lines are more affected by minor power disturbances, increasing attention will be given to voltage regulation, both in the plant and in the utility system. Closer coordination between electrical engineers in industry, power salesmen, consultants, and equipment suppliers is inevitable.

Industrial distribution design will reflect these changes. Higher possible fault currents point to more load center substations and higher voltage distribution. With the entire production cycle dependent on continuity of power, there will be increased emphasis on relaying to isolate faults and avoid complete plant shutdown. Need for better knowledge

Positive Program to Beat Foes

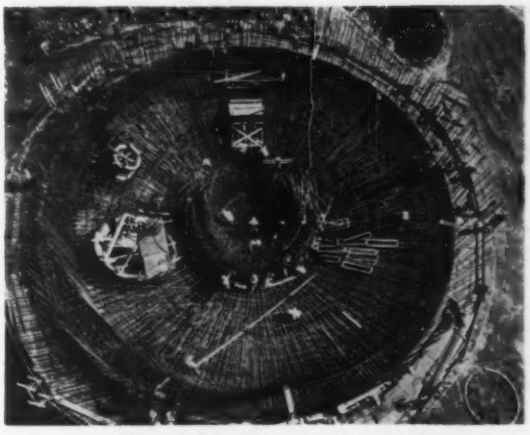
pense. The political connotations are too obvious to expatiate upon here.

Thus a change is still pending and the presence of the large Democratic majority in Congress indicates a continuing drift toward more federal participation in our nuclear power program. This drift was evident despite the presentation of bold and imaginative proposals by elements of the electrical industry.

These proposals, though individually and collectively unsuccessful in kindling the spark of leadership, in failure pointed a powerful moral: if leadership can be regained it will be done through properly timed dramatic action backed by the entire industry in concert.

Alongside the leadership problem, the technical aspects of advancing nuclear power seemed pale. The handful of plants now operating logged successful and invaluable hours, and others ground forward methodically in design and construction. No new plants went on the line in 1958. None will roll in 1959.

How to contain and impede this drift toward more federal participation in our nuclear power program will be the number one utility nuclear problem of 1959. Certainly direct competition with the federal government is both impossible and unwise. But the stakes are high and the utility industry must seize the initiative and support an imaginative, positive, and timely program for the development of nuclear power or else complete domination by the federal government in this field will result.



YANKEE nuclear plant takes circular shape

Costs Means Gain in Power Sales

of operating parameters under normal and emergency conditions will encourage the use of system analyzers in distribution design, load flow studies, flicker analysis, interrupting duty calculation, and stability studies.

Moreover, the electrical systems serving these plants will need more highly-trained people to design, operate, and maintain them. Recognizing that only a few industrial giants have the facilities to train their own men, utilities and manufacturers can be expected to expand their industrial training programs beyond the high levels reached in 1958.

Industrial use of power will be stimulated further by new and improved processes that appeared in 1958. Techniques for direct reduction of iron ore, demands for new, higher purity metals, and improvements in electric furnaces will open new horizons for the electric furnace in industry. An electric arc process for fabricating small precision parts from powder form without subsequent machining, holds promise of a wide variety of applications. Ultrasonic welding, spark discharge machining, and the increased use of programmed machine tools will lead to even further growth.

Industrial lighting levels are in for an increase, too. The new IES standards, providing for the first time scientifically determined lighting levels for specific industrial tasks, will emphasize the role of lighting as a production tool and enable industrials to tailor lighting installations to match specific production needs.

Use of air conditioning and electric space heating in industry is also looking up. Increased use of high quality, precision parts, competition for skilled production workers, and growing concern over air pollution are all feeding the demand. Moreover, the heat pump has proven itself in action, even in 7,000-degree-day areas. And as industrial loads grow, shifting power rates into lower cost steps, the net cost of "fuel" for electric heating and cooling gets lower. Reflecting this growing potential is the Industrial Electrification Council's newly organized committee to consider an educational and promotional program in these areas.

How does it all add up? With economic pressures on the increase, industry will step up its spending for modernization to hold down production costs of facilities becoming increasingly obsolete. Coupled with the new, power consuming production tools, modernization efforts will assure electrical system growth that will match or even exceed the spectacular surge since the second World War.

Purchasing

How Long Can Lower

Some one must eventually pay the piper, and utilities must share responsibility

Inventory, lead time, new orders and prices for electric utility equipment all tumbled at the same time during 1958 to the delight of utility purchasing agents and the consternation of manufacturers.

Under pressure from within to cut costs and expenses in line with the reduced tempo of energy sales growth, utility PA's took advantage of the ready availability of materials and equipment by: Chopping inventories, shifting more inventory responsibility on some items to manufacturers, allowing for less lead time on new orders and shopping for the best price available.

Inventory cuts were to be expected and were probably long overdue considering the business outlook. Actually, they were artificially high, due to the rapid pace of utility expansion since World War II. With a certain amount of reserve capacity backing them up, PA's seized the opportunity to reduce inventories an average of 20% with some cuts running as deep as 35 to 40%.

In line with these cuts, PA's placed more reliance on suppliers' local field stocks of essential items to guard against emergencies such as the Heat Storm of 1955 and the destructive eastern snow storm of last spring.

But while PA's worked hard to chop inventory investment, they worked just as hard at making new purchases at the lowest price available. With reduced requirements in their favor, PA's took advantage of suppliers' open order books by indulging in widespread price shopping reminiscent of the last white sale. Apparently, very few utility items passed the year without selling at a discount at one time or another.

This situation was the cause of grave concern to the manufacturers. With operating rates at a low level, and profit margins being pinched by increased labor and material costs on one side and falling prices on the other, manufacturers looked around for various means to meet competition and at least preserve dwindling profit margins.

To achieve this end, many electrical manufacturers have considered resorting to the following economy measures:

- Reduce or eliminate research and development expenditures.

Political

Election Sweep Poses

New surge for federal power measures certain. TVA bonds, NW authority on list

In 1959, the body corporate of the American electric power industry probably will have a bad case of political measles. Although the initial attacks will take place on Capitol Hill, the government-power splotches will be breaking out in areas all over the country. Some of the symptoms already have been recorded.

In the Northeast, the New York State Power Authority, under the leadership of Chairman Robert Moses, has made a bid for enabling laws from the state legislature to permit it to build steam and nuclear plants. At present it is authorized only to build hydro facilities. Whether it will get the necessary legislation to insure that its future will be "dynamic, not static" depends to a large extent on the support it gets from Republican Governor-elect Nelson Rockefeller. Although Rockefeller has not committed himself, he is known to be of a liberal persuasion in these matters.

In the Tennessee Valley, power developments will probably be two-fold: A TVA self-financing bill, and a series of service-area nibbling actions by pro-government power local officials in the TVA fringe areas. The self-financing bill will very likely be identical with the one introduced during the last session of Congress. About the agitation of some local officials in the fringe areas to get TVA power, there is the feeling on the part of usually well informed sources that this is being centrally directed and aided.

Possibly the biggest power boiling pot in '59 will be in the Pacific Northwest. Here the combined efforts of Sens Richard Neuberger and Wayne Morse and the Corps of Engineers—all backed politically by a strongly Democratic Congress—spell gloom and trouble for the private power companies.

Sen Neuberger's new Columbia River Development Corp bill will be as tough on the investor-owned utilities as his older one. It's too early to talk yet about the bill's passage, or just what form it will take when it comes out of Northwest and Washington hearings. Watch the Neuberger-Morse relationship, which seems to be shaping into a rivalry for who will be the Pacific NW's Galahad. Morse will make another try at getting a federal high dam at Hells Canyon. Although admitting that such a dam would flood out Idaho's Power's Brownlee dam and perhaps Oxbow also, Morse has been hedging on the kind of compensation the company would receive. His yardstick for the kind of effort he will put behind getting the dam is its "benefit-to-cost ratio".

Another Northwest headache for power companies is the U. S. Army Corps of Engineers' recommenda-

Prices Remain Real Bargains?

- Cutback "extra" services provided utilities such as engineering assistance, system studies, technical information, etc.
- Charge for these "extra" services.
- Pull out of industry load promotion programs.
- Reduce quality of products to meet minimum EEI-NEMA specifications only.
- Devote more of their capital expenditures to improving efficiency of existing plant rather than expanding productive capacity to meet peaks in utility ordering.
- Discontinue unprofitable product lines.

If these proposals are instituted they will not only weaken the industry's enviable buyer-supplier relationship and increase utility expenses, but they could also:

- Reduce the number of alternate suppliers, thereby ultimately increasing prices.
- Force a revision of utility operating standards based on equipment built to more than minimum EEI-NEMA specifications.
- Put added emphasis on system planning to avoid costly delays on new installations required when utility ordering hits its cyclical peak.

It's obvious that both sides would lose under such conditions. But since we live under a profit-motivated, free-enterprise system, any or all of these proposals are distinct possibilities in the near future.

No doubt there is much to be said on both sides of this question over prices. But with 1959 just around the corner it appears both buyer and supplier have some serious soul searching to do if the industry is to maintain its rate of growth and its reputation for dependable, low-cost electric service.

A solution to at least part of this problem seems obvious. Under present conditions, with neither utilities nor manufacturers operating at full capacity, both are in a position to help each other. But the responsibility for implementation rests with the utilities.

They are now in a position to place orders well in advance of requirements since it will take two or three years for load growth to catch up with installed capacity. Placing such orders will help manufacturers hold the line on costs by permitting them to: Make optimum use of skilled manpower and high cost production facilities, eliminate overtime payments and limit capital investment in new facilities required only to meet peaks in the utility ordering cycle.

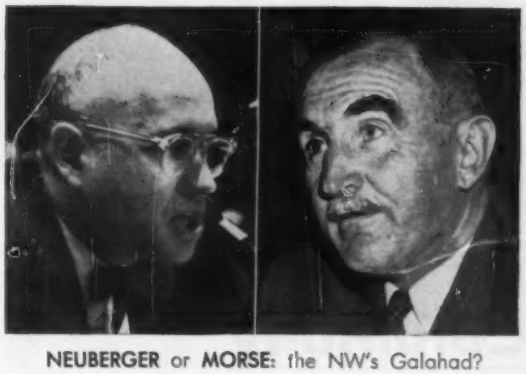
Tough Problems in Several Areas

tions for 12 new dams on the Columbia River system. This recommendation amounts to support of the project by the Corps itself—a position it is taking despite the opposition of several government officials, among them Interior Secy Fred Seaton. One of the main points of the Corp's recommendations is a high dam at Mountain Sheep on the middle Snake. This is a plan and site for which the Pacific Northwest Power Co is seeking an FPC license.

In California, the big issue will probably be the Trinity River development. New Governor-elect Brown favors federal development to that by Pacific Gas & Electric. Here again, the issue is not clearly resolved. It is just too early to predict an outcome.

In Washington, a number of issues will command the power companies' attention. An AEC-Congressional clash over the atomic power development program may not be long delayed. Democrats like Sen Gore of Tennessee have already made it plain they will push for a stepped-up program of reactor development and construction. On the other hand, the Administration is trying to hold down spending, and is likely to take a tougher attitude toward AEC spending in the next fiscal year.

Early in the year there will probably be a deadlock in the FPC-ECAP tax case. It appears that the January meeting will be postponed almost immediately after it convenes in order to permit a full-commission ruling on what the issues are to be. FPC will probably contend that the only issue is a narrow accounting determination, while A. J. G. Priest, counsel for 53 of the utilities fighting the ruling, will probably urge that the utilities have the right to present broader testimony as to why all ECAP contributions are a deductible business expense.



NEUBERGER or **MORSE**: the NW's Galahad?

Regardless of the outcome of particular issues, the electric utilities, slated for a bout with political-public power measles, may not come out of it in better health than when they went into it.

Methods Improved Techniques Are

Constant flow of new ideas offers promise of economies in operation, construction

Today there are strong arguments for the industry to continue its efforts—through methods improvement—to lower or at least hold the cost line, improve the quality of service, increase sales, and build greater confidence in the industry. Methods improvement centers on a critical self-analysis that has brought the industry better methods by posing questions and then supplying the answers.

"Why do it at all?" might be asked of any utility method or practice. In an appraisal of the answer, some managements have abandoned long-standing practices like monthly billing of residential customers. Stores people in other companies have eliminated seldom-used materials from inventory. After studying the need, utility design engineers have dropped spare equipments from new facilities. In stores and plant accounting, the answer led to reduction of paperwork through use of "exempt" or "minor" materials plans.

"Why do it this way?" should be asked next. Often times a necessary practice can be done better in another way. Thus, utility management has adopted decentralization of authority, electronic data processing for many accounting operations, and leasing arrangements for buildings, vehicles and equipment. Engineers have turned to new materials for conductors and for structures.

For more efficient overhead line work, operating forces now use powered aerial lifts and booms, have equipped their vehicles with power hand tools, and continually devise special vehicles. Standardization as a means of methods improvement has reduced the numbers of sizes, shapes, and types with lower cost the final result.

Metering Sample Testing Leads

Stage is set for across-board advances in art with sample testing but a preview

Random sample testing seems destined to dominate metering advances in the coming year. For it offers utilities the unique advantage of revealing a larger portion of meters which have drifted from their initial accuracies with a smaller number of tests.

Already utilities have swung to random sample testing in the six states whose commissions permit it. Additional utilities are changing testing procedures in states where hearings on random sampling brought approval of modified plans. And in numerous other states, utilities are screening meter data in anticipation of applying the new techniques.

Random sample testing has earned a place on engineering programs. It will retain that place in the coming year to report to utility engineers the experiences and improvements stemming from pioneering applications.

Testing requirements may show little change, initially, with adoption of random sampling techniques. But as data are secured to rate meter types according to sustained accuracy, benefits will begin to grow. The impact on testing schedules will be slight at first. But if it only stems the expansion

Continuity Goals Depend

Analysis of interruptions will provide basic data for setting realistic service standards

Continuity sorely needs a numerical measure which is acceptable to the utility industry. With such a measure, and the data that it makes available, continuity will soon take its place, alongside voltage, frequency, and capacity, as a predictable element of service quality. Utilities will then be able to evaluate the service they give and correct its deficiencies. The same basic knowledge will enable them to design systems to assure service of the quality required for satisfactory performance of customers' electrical installations.

Progress toward this goal has been slow. But two recent developments have minimized formidable barriers. These are:

1. Sweeping acceptance of electronic data processing techniques which enable utilities to analyze masses of data at reasonable cost.

2. Agreement among key utility engineers that service continuity can be measured in terms of interruption frequency and duration per average

Key to Holding Costs in Line

"Can it be improved upon?" will keep the analysis in motion and may lead to a modification or variation of the basic theme. Engineers have improved transmission lines by bundling conductors, and are turning to use of digital computers for solution of problems. Crews now use helicopters for line patrol, transport of material to inaccessible places, and more recently for chemical spraying of transmission and subtransmission rights-of-way.

Materials and supplies are handled more efficiently with power lift trucks and palletizing. Mobile radio and microwave communications provide for better system operation during emergency as well as routine conditions. Efforts to improve public relations have brought communications "links" with the public. Promotional rates and freedom of use of equipment both bring an increase in sales of energy.

"Can something more be done?" may round out the approach. Thus, many utilities offer their customers financing plans for appliances, stage kitchen and home appliance demonstrations, and make facilities available for public meetings. For their employees, other utilities conduct training courses and support educational programs. Sales departments hold clinics for better lighting and industrial heating, sponsor demonstration homes to promote all-electric living, and work actively with trade allies.

These few ideas for methods improvement are meant only as a starting place in a wide field. Methods improvement need not stop with the first time around. It can go over the same ground to uncover new ideas, materials, or methods that have been developed since the first question was asked. The electric industry was left by its founder, Thomas A. Edison, a heritage of methods improvement in both his actions and his words: "There's a way to do it better—find it."

Way, Other Improvements Coming

in testing required today for the growing number of meters in service, it will bring substantial future economies.

Other facets of the metering art are likewise ripe for new engineering appraisal. Million-kw loads, for example, were not envisioned when today's demand totalizing systems were invented. There is evidence to argue that new methods must be developed to meter such loads with an accuracy commensurate with the revenue they produce.

The stage is set for improvements across the board in metering. And meter engineers, with random sample testing an accomplished fact, will continue their push for correction of their problems.

TESTING LINE speeds handling of residential meters

On Ability to Measure

customer and the extent of the area affected by the interruption.

Interruptions are infrequent on today's distribution. Performance is a tribute to the unswerving effort of utility engineers to furnish quality service. But its very perfection forces them to analyze many unit-years of operation to determine the true parameters of service continuity.

Today the utilities which pioneered punch-card analysis of interruptions are collecting valuable data at a rapid rate. And the growing exchange of such performance data will bring the additional benefit of cooperative effort by a much larger task force. These utilities will soon have the facts to design their systems to meet any standard of service quality.

With new system design data close at hand, utility engineers will focus their research on evaluating the true service requirements of their customers' electrical equipment. This knowledge will enable them to set realistic goals for system designs, avoiding the extravagance of near-perfect service and the dissatisfaction which stems from excessive customer interruptions.

Distribution

More Underground

Growing interest of engineers and customers assures use on an increasing scale

Distribution is going underground in many residential areas. Experience has shown that customers frequently want it there enough to pay extra for it.

Growing pressure in many areas has spurred distribution engineers to new efforts to cut the premium for residential underground. They have been aided considerably by the growth in per-customer demand and revenue. But they have also proposed radical departures from established practice.

Buried cable was applied to 12-kv residential-area distribution in 1958. Commonwealth Edison had pioneered development of 5-kv buried distribution. Highly satisfactory results with 5-kv cable prompted them to explore buried cable distribution at 12 kv for fast-growing areas.

Shielding will be necessary with the higher voltage cable. It will be provided by a semi-conducting covering. The 5-kv cable had sufficient shielding from the earth in which it was buried and from the stranded neutral. This incidental shielding will not be adequate at 12-kv.

Other problems anticipated with the higher voltage cable include: Increased difficulty with stress distribution, a greater tendency toward corona cutting, and a greater leakage problem. Lead-covered cable would protect its insulation from oxidation, improve stress distribution and be easier to terminate and splice than the concentric type selected. But it would cost about 25% more than the concentric cable selected for the job.

Outdoor terminations have proved to be a problem with 12-kv concentric, direct-buried cable. Potheads will be used initially but epoxy resins brushed on layers of glass tape may be the ultimate solution. Terminations for indoor or shielded locations will be made without potheads.

Much attention has been devoted to transformer enclosures for buried-cable distribution. Primary objective is economy but there is also an improvement in appearance. Early installations were made with 4-ft sewer tile, large enough for 37½-kva transformers in the 5-kv class. But the large 12-kv transformers and associated switching equipment required 5-ft diam. fiber-glass or steel enclosures.

The latest development is the transformer with an integral compartment for cable terminations, cutouts and arresters, designed for installation on a concrete pad. The new design provides improved appearance and operating features. A barrier between primary and secondary terminals permits working on the secondary side without disturbing the primary or being disturbed by it.

Commonwealth Edison has required the developer to pay the difference between underground and overhead. This difference decreases as the connected load increases, dropping to little more than

Transmission

Today's Task Is to

Expanding demands call for changes in voltage, conductor, and tower patterns

Transmission in the closing years of the 1950s is in transition. Power systems are emerging from a decade of expansion that has seen generating capacity nearly tripled. Now on the eve of the 1960s they face another decade of even greater growth in which transmission will play a critical role. But it is one in which the present patterns of voltage, conductor configurations and tower designs will be drastically changed.

Generating plants and unit sizes are clearly outrunning today's transmission capabilities, keyed as they are to conductor and voltage patterns of two decades ago. Since 1940 the average size of all steam plants in the U. S. has climbed from 30,000 to 91,000 kw today and will exceed 125,000 kw in the early 1960s. But the average size of new units has doubled in the five years, reaching 100,000 kw in 1957 with 181,000 kw probable within the next five years.

Meeting these trends will be neither easy nor inexpensive. Today 85% of the transmission system circuit miles of all U. S. utilities is still tied to voltages of 138 kv and below; operating voltages related to generator and transformer unit designs of 50 or 60 Mw prevalent in the 1940s, but unsuited to the 200 to 450 Mw sizes, in prospect.

Transmission designers face a complex job. By 1965 U. S. utilities must be ready to carry 238,000-000 kw to market. Starting with transmission systems that today are based on outdated voltages, conductor sizes and configurations, system designers face a tough task. They must restore the precarious balance between generating capacity and transmission capability while at the same time providing getaway capacity for future super-powered stations of 1,000 Mw over scant rights-of-way, already crowded with structures and lines of inadequate capacity.

Fortunately solutions for some of these problems are already appearing, and some of the events and developments of 1958 foreshadow trends of tomorrow's transmission systems.

The trend to higher transmission voltages is

Coming as Costs Are Trimmed

the cost of trenching and backfilling for complete electric living.

Union Electric Co is using neoprene-jacketed PILC cable for direct-buried 12-kv 3-phase service. A 2,500 volt submersible disconnecting pothead, modified and adapted to fit the bushing, permits the use of CSP transformers and provides for disconnecting the cable.

Underground distribution has developed along somewhat different lines in Detroit Edison's residential areas. Concentric cable is not suitable for their delta type of system so they install single-phase primaries of rubber-lead cable in heavy-wall parkway conduit. Above-grade transformer cubicles are 400 ft apart and each service is brought to the transformer. Where the homes are one lot removed from the cubicle, the services are installed in conduit in the easement.

Experience has shown that residential customers want underground distribution. In general they are willing to pay a premium for it but they resent the feeling that the price is rigged to keep them from having what they want. So far it has been possible to get costs within reach only where designs have been developed for reasonable costs and where these low-cost designs have been combined with mass production methods. Growing interest on the part of distribution engineers and customers assures further developments and the applications of underground distribution on an ever increasing scale.

TRANSFORMER ENCLOSURES for buried systems are redesigned to improve appearance, facilitate use

Build for A Big Tomorrow

accelerating. From a standing start in 1953, when the first 62 miles went into service, extra-high voltage lines in the 330-345 kv range now aggregate 2,626 miles and will top 3,000 miles in a matter of months. In the five years 1951 to 1956 circuit mileage of 230-kv transmission jumped 62% from 8,715 to 14,177 after a sustained static spell.

A new and even higher transmission voltage level probably pegged at 460 kv is already drawing interest from several utilities. In support of the need for research in this and higher voltage ranges two major research projects, one in the U. S. and one in Canada were launched this year. The U. S. project will continue five years and reach to 750 kv. In the light of the interest it is not difficult to foresee 460-kv circuits in operation by 1965 or shortly thereafter.

Early availability of cable in the 345- to 400-kv range that will be suitable for U. S. loading conditions is easy to foresee. Sample lengths of 345-kv pipe-type cable; Pirelli-type oil-filled cable; and high-pressure, oil-filled aluminum sheath cable have been prepared by four manufacturers that are cooperating with the utility industry's High-Voltage Field Testing Program to be initiated at Cornell University soon.

Measures to conserve the scant and already crowded transmission right-of-way and make it yield a higher return is sure to get more attention in 1959 particularly in and around major power stations. One major company is systematically eliminating 132-kv from its system. Bigger 220-kv towers and conductors are replacing it in R/W so liberated.

Modification or elimination of broken tower assumptions on several new tower lines in the 138- to 345-kv range will be used to design compact towers that can be shoe-horned into crowded situations to conserve rights-of-way. We look for this to continue as long as routes around major stations remain crowded with low voltage get-away circuits on towers too light for heavier single or bundle conductors.

Porcelain too will be used in a variety of forms to restrain conductors and control ground clearance so that shorter tower arms can be used in congested line locations.

Use of high strength, low-alloy steels in towers

will grow where its properties can be used to cut tower weight and fight corrosion. Carbon steel remains the structural material of choice for transmission structures by a commanding margin. But in recent months the installed cost margin has been cut by price shifts enough to make aluminum attractive for towers in a few areas where corrosive conditions make periodic painting necessary or weight is a key factor.

Increasing power concentrations on transmission circuits particularly in seacoast and industrial areas is putting a premium on contamination control. Resort to fog-type insulators is widespread. Silicone greases are being used in insulators to entrap contaminents and prevent formation into electrolytes in the presence of fog or light rain, producing flashovers. Washing of insulators too is easier and more common with the introduction of truck mounted aerial lifts.

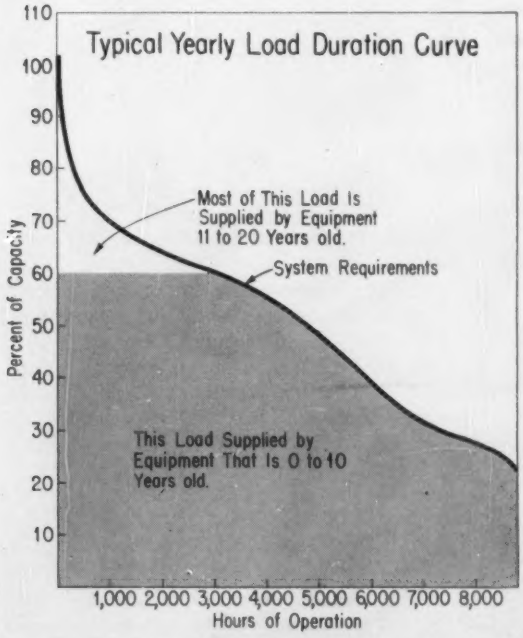
Today power systems face a new era of growth. Outgrown transmission patterns must undergo fundamental changes. As these transitions take shape it is vital that the increases in voltage levels, conductor sizes, and tower designs be big enough to meet foreseeable future growth.

In the last analysis the towering task facing the utility industry is to get transmission ready for a big tomorrow.

Peaking Units to Fit the Need

Problems vary with different systems, but study is due on special units for peaking

Arguments for the installation of new capacity specifically designed for peaking operations have been cited often and in many places during the past few years—including Electrical World.



TYPICAL YEARLY LOAD DURATION CURVE indicates that most of the system requirements are supplied by relatively modern equipment (assuming the system has doubled within the last ten years—average for the industry). With a near saturation of the system with efficient equipment the addition of new equipment to the system can not be decided on an efficiency basis only

Yet they bear repeating because each new unit added to a system can make the maximum economic utilization of existing capacity unattainable if the new capacity is purchased solely on an efficiency basis and without regard to the possibility of a peaking problem.

Perhaps the first thing to realize when considering the possibility of adding peaking capacity is that it is not a substitute for existing capacity but a substitute for a means to postpone the installation of new base-load capacity. It is added to the system near the top of the load duration curve rather than at the bottom—the point of entry for new large efficient capacity.

The reasons for considering installation of new equipment specifically for peaking operation center around several facts. For one thing we are running out of old inefficient stations normally used to meet peaking requirements. And the need for adequate sites, many of which are occupied by these older plants, may accelerate their extinction.

The second thing to consider is the efficiencies of the new large units that can be added to a utility's system. Increases in efficiency of these new units are not as rapid and substantial as they have been in the past. Many systems, particularly those that have their greatest growth in recent years, are becoming saturated with machines nearly as efficient as the best available. Many utilities are required to shut down modern reheat units over night. And one equipment manufacturer predicts that if present practice continues, today's new base load units will move into overnight shutdown and partial peaking operation in 5-7 years.

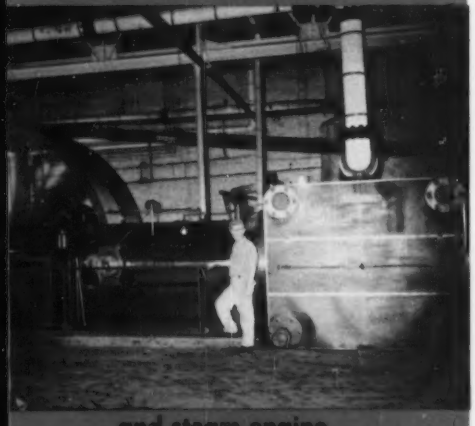
When we last discussed this peaking situation editorially (EW June 2, p 39) we concluded with the following paragraph. "Like many other problems facing the utility industry today this problem of peaking capacity will vary with the different operating systems. However, peaking capacity provided by several types of prime movers is available today and it is never too soon to evaluate their merits."

We still think it is appropriate.

Electrification Trims Grain Elevator Maintenance Costs

GLEN J. ALDEN, Industrial Sales Engineer, Minnesota Power & Light Co., Duluth

Previously, power came from low pressure boilers . . .



and steam engine . . .

▼ driving endless rope pulleys

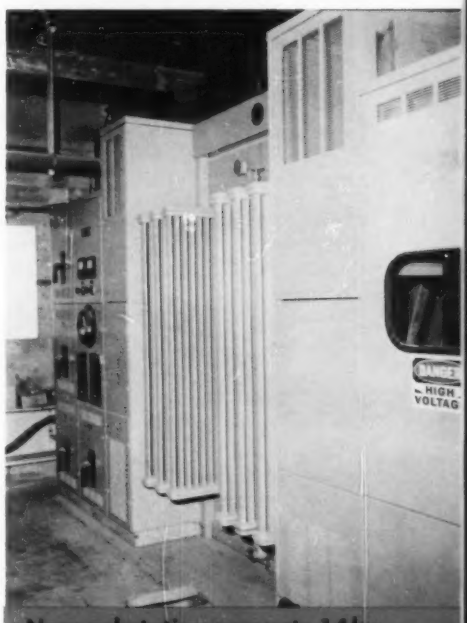
Increased efficiency and lower costs are the results of an extensive electrification program in the 6-million bushel grain elevator of the F. H. Peavey & Co., Duluth, Minn. Replacing a 1,500-hp cross-compound condensing steam engine with purchased electric power, the program involved installation of approximately 2,400 hp of individual drive motors.

Elimination of the steam engine and the two associated low pressure boilers freed 7,000 sq. ft. of floor space. Fluid couplings on the individual drive motors enable them to start the elevator under load if necessary. Savings in expenditures for labor, fuel and maintenance will pay for the cost of the electrification program in a few years.

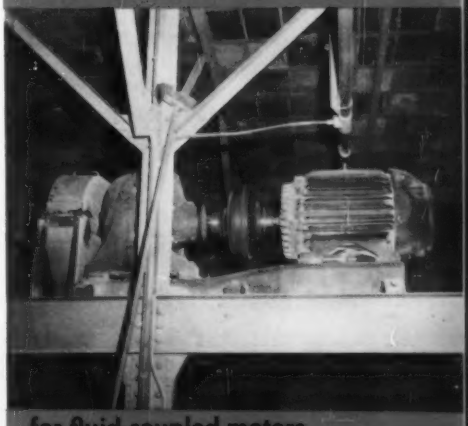
Before the mill modernization, the steam engine flywheel was rope belted to the drive shaft which, in turn, was rope belted to other shafts throughout the elevator. Rope drives were used off the drive shafts. When a rope broke, it often tore out pulleys and caused undesirable delays, in addition to costly maintenance. Because the steam engine was the only source of power in the mill, it had to be operated continuously, creating a very inefficient operation.

Power is now bought at 14 kv and brought into a new 1,500-kva 14 kv/480-v, three-phase transformer. The 480-v distribution system serves motors throughout the elevator. The largest motor, used to drive grain legs, is rated 100 hp.

Another new feature of the modernization is a dump-type grain car unloader which will require an additional 400 hp.

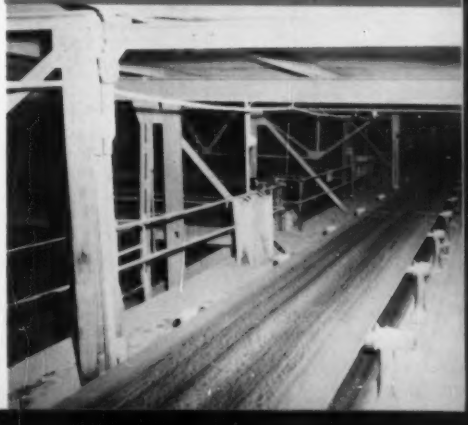


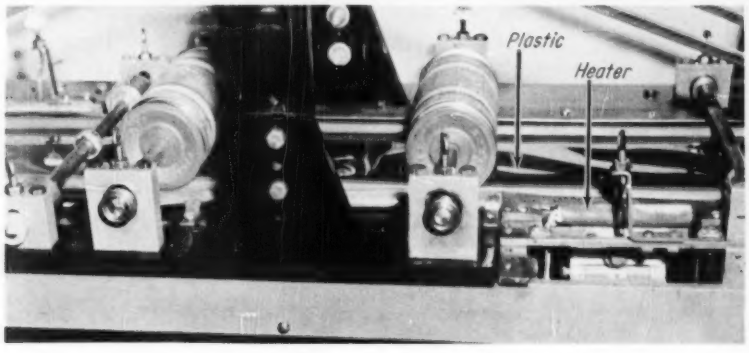
Now substation converts 14 kv purchased power to 480 v. . .



for fluid-coupled motors . . .

on grain conveyors . . . ▼





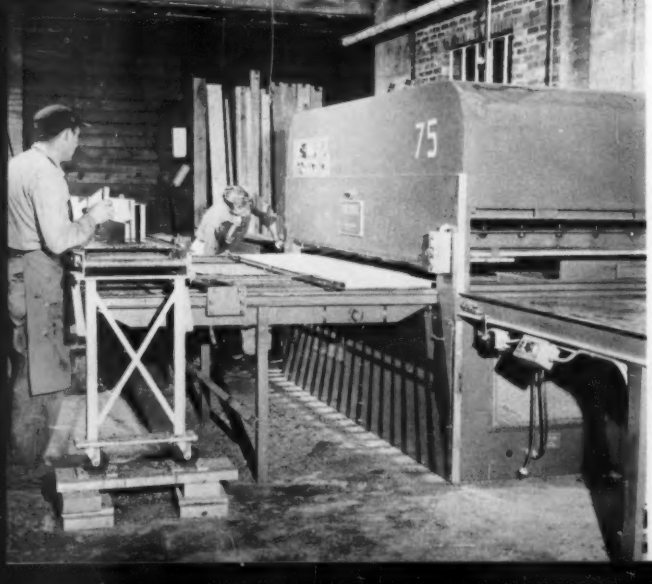
Heat Key to Process Success

CHUCK FELDSTEIN, Power Sales Engineer, Texas Electric Service Co., Fort Worth

Control of heat to within one or two degrees was a prime consideration in the design of the unique, electrically heated plastic envelope machines now in use at the Samsill Brothers Plastic Co. in Fort Worth, Texas. Designed and built by Samsill's owners, the units automatically combine stock plastic sheet with insert paper, then fold, punch, and cut the combination to size. Each unit uses 3 kw of cartridge type electrical heaters. The machines, the only units of their type in the South, make a profitable operation of a process that would be impractical if done by manual methods.

The accurate temperature control possible with the heaters keeps the plastic material from cracking due to low heat or bubbling and burning because of excessive heat. Moreover, the electric heaters eliminate both the fume removal problems and the fire hazards that other heating methods would create. Intensity of the heaters can be adjusted for different gauges of stock material to make the machines even more versatile. The units can turn out envelopes ranging from ⅞ x 1¼ inches to 14 x 17 inches.

Dielectric Heater Saves Time And Space



W. F. HUTCHINS, Industrial Sales Engineer, West Penn Power Co., Ridgeway, Pa.

Efficient electric heat has cut the time required to glue wooden joints from hours to minutes at the Hyde-Murphy Co. in Ridgeway, Pa. A 20-kw dielectric heater, replacing a manual, air drying method, can handle joints up to 100 ft. and produce a bond as strong as the wood. It requires less space and is more economical to operate. Products are used in shelving, furniture ends, and door and panel cores.

Formerly, pieces were ripped and jointed, then glued manually and left to air dry—a process that took hours. Now they are ripped only, edge-glued on a continuous gluer, and fed into the heater. They emerge in seconds, ready for the planer. The heater can be side or end fed and takes sections up to 100 inches at a time.

Air Conditioning Ends Quality Control Problem

HOMER H. TURNER, JR., Industrial Power Engineer, Alabama Power Co., Bimingham, Ala.

Combining air conditioning with lint-free clothing has alleviated a quality control problem at General Electric Co.'s electronic tube plant in Anniston, Ala. The air conditioning also reduces oxidation of steel parts and improves employee efficiency and morale.

Previously, quality control was troubled by tube failures caused by microscopic pieces of lint, from the employees' clothing, which became sealed in the tubes and, during tube processing, formed carbonized conductors. To alleviate this, the company furnished employees with lint-free clothing to be worn in the plant. Because this clothing was uncomfortably warm during the summer months, the company decided to air condition the working areas.

Thirty 15-ton units and twelve 30-ton units were installed in the production area and cafeteria. Total capacity, including units previously installed in offices and spray room, is about 1,000 tons.

Heat collected by the units is dissipated by a 1,200-ton water cooling tower, which circulates 3,450 gallons of water per minute during peak operation. To serve this tower and the packaged units, the company installed a 2,000-kva substation.

Air is circulated and filtered continuously throughout the year to remove dust particles that would be impossible to sweep out. However, cooling capacity is shut off when not needed.

New Terminal Heats Everything Electrically

GEORGE C. WAGNER, Industrial Sales Engineer, Union Electric Co., St. Louis, Mo.

Electricity fills every heating need in the new terminal of Motor Cargo, Inc., in St. Louis. Two 5-ton heat pumps heat and cool the 6,000-sq. ft. office and locker room space. Dock area office (left) has a resistance type space heater. And the water heater is electric, too. Heat pumps were chosen as main heat source through competitive bidding after a successful installation at another local trucking company.

What's Your Production Problem?

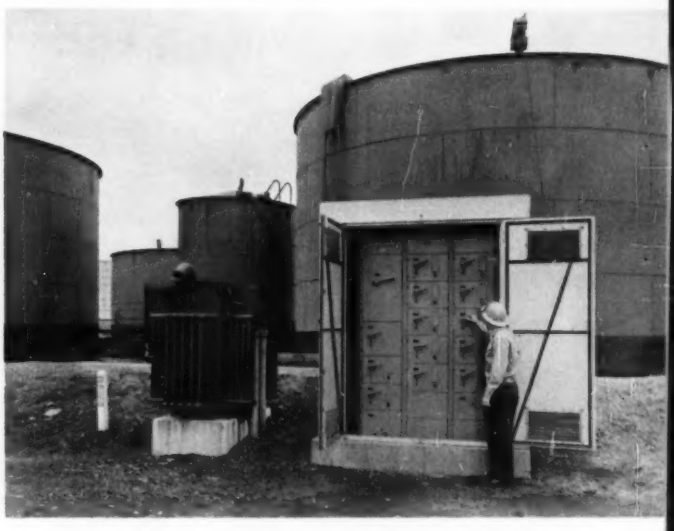
If you have problems in lighting, drying, casting, forging, painting, or materials handling, consult your local power company. Let their experienced specialists show you how to cut costs with electric power.

New Distribution Boosts Plant Efficiency

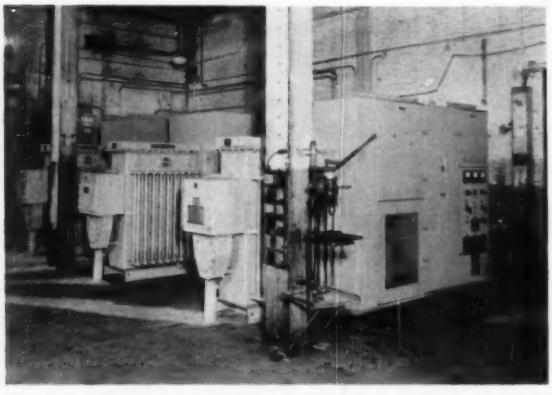
J. C. **HANDY**, Industrial Sales Engineer, Baltimore Gas & Electric Co., Baltimore, Md.

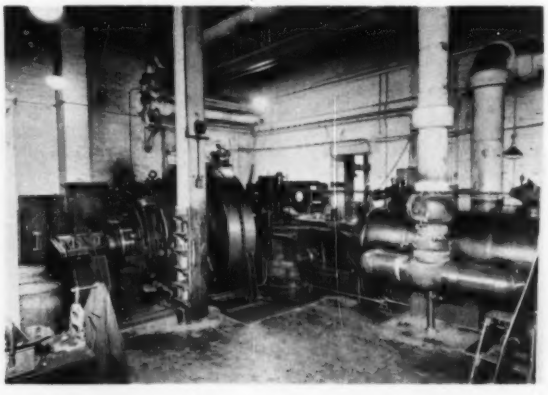
Replacing an outgrown secondary distribution system with modern 13-kv distribution and up-to-date equipment has improved equipment efficiency, cut power losses, and provided additional capacity for a major expansion at American Bitumuls & Asphalt Co., Fairfield, Md. Underground 13-kv cables carry the service close to the point of use and eliminate the high voltage drop in cable that characterized the two old 480-v systems. Five new distribution centers, located near the loads they serve, reduce the 13 kv to 480 v to drive pumps and other equipment. With less voltage drop and power waste in the distribution system, motors have full starting voltage and equipment operation is improved.

New equipment includes five modern transformers, aggregating 2,000 kw. Switchgear and motor controls are metal-clad, housed in outdoor enclosures. The new distribution enabled the company to make a major expansion that boosted total load from 950 to 1,475 kw.



And there is sufficient capacity to serve additional transformers if the need arises. Electrical equipment in this plant comprises mainly pumps and other apparatus used in the production of asphalt cements, cutbacks, Bitumuls, and industrial specialties refined from crude oil.





Purchased Power Replaces D-C Generators

R. H. **FRANKLIN**, Industrial Representative, Public Service Electric & Gas Co., Jersey City, N. J.

Installation of three 150-kw mercury arc rectifiers, a step in a progressive plan to modernize their d-c power supply, has produced satisfactory results in fuel and labor costs at the Joseph Dixon Crucible Co., Jersey City, N. J.

The rectifiers replaced a group of d-c generators driven by steam engines. Exhaust steam from the engines could not be economically used, particularly in the non-heating season.

Power is purchased at 4,150 volts and converted by the mercury arc rectifiers to 250 volts d-c for use in the plant.

The rectifier equipment was chosen because of efficiency and convenience.

Lighting Levels for Industrial Areas—II‡

Table lists recommended levels of illumination for specific eye tasks in various industrial areas. These data are adapted from the foot-candle tables issued recently by the Illuminating Engineering Society.

FOUNDRIES	Ft-c*
Annealing (furnaces)	30
Cleaning	30
Core making (fine)	100
Core making (medium)	50
Grinding and chipping	100**
Inspection (fine)	500**
Inspection (medium)	100
Moulding (medium)	100
Moulding (large)	50
Pouring	50
Sorting	50
Cupola	20
Shakeout	30
IRON AND STEEL MANUFACTURING	
Open hearth	
Stock yard	10
Charging floor	20
Pouring slide	
Slag pits	20
Control platforms	30
Mold yard	5
Hot top	30
Hot top storage	10
Checker cellar	10
Buggy and door repair	30
Stripping yard	20
Scrap stockyard	10
Mixer building	30
Calcining building	10
Skull cracker	10
Cinder dump	0.1
Rolling mills	
Blooming, slabbing, hot strip, hot sheet	30
Cold strip, plate	30
Pipe, rod, tube, wire drawing	50
Merchant and sheared plate	30
Tin plate mills	
Tinning and galvanizing	50
Cold strip rolling	50
Motor room, machine room	30
Inspection	
Blackplate, bloom, billet chipping	100
Tinplate, other bright surfaces	100†

INSPECTION	Ft-c*
Ordinary	50
Difficult	100
Highly difficult	200**
Very difficult	500**
Most difficult	1,000**
PAPER MANUFACTURING	
Beaters, grinding, calendering	30
Finishing, cutting, trimming, paper-making machines	50
Hand counting, wet end of paper machine	70
Paper machine reel, paper inspection and laboratories	100
Rewinder	150
RUBBER TIRE AND TUBE MECHANIZATION	
Stock preparation	
Banbury, plasticating, milling	30
Calendering	50
Fabric preparation	
Stock cutting, bead building	50
Tube tubing machines	50
Tread tubing machines	50
Tire building	
Solid tire	30
Pneumatic tire	50
Curing department	
Tube curing, casing curing	70
Final inspection	
Tube, casing	200**
Wrapping	50
STORAGE ROOMS OR WAREHOUSE	
Inactive	5
Active	
Rough bulky	10
Medium	20
Fine	50
TESTING	
General	50
Extra fine instruments, scales, etc.	200**
WELDING	
General illumination	50
Precision manual arc welding	1,000**

* Minimum on the task at any time.

** Obtained with a combination of general lighting plus specialized supplementary lighting. Care should be taken to keep within the recommended brightness ratios. As far as possible the installation should eliminate direct and reflected glare as well as objectionable shadows.

† Specular surface of material may necessitate special consideration in selection and placement of lighting equipment, or orientation of the work.

‡ Additional industrial areas with recommended lighting levels were listed in Electrical World. December 15, 1958, page 42.

EXTRA VALUES

1

FORM 406
FLUORESCENT LUMINAIRE

INTERNAL FAN COOLING

- Air-circulation system—a G-E exclusive—boosts light output of luminaire up to 25%.
- Four Power Groove lamps generate 37,200 lumens.
- No increase in unit cost.
- Completely factory-assembled and tested; shipped in *single* carton.
- Ideal for business streets, traffic arteries, expressways, interchanges, parking lots, shopping centers.

2

"TEE-LIGHTING"
FLUORESCENT SYSTEM

NEW STREET-LIGHTING CONCEPT

- Ideal for "prestige" lighting of business whiteways.
- Highest utilization efficiency of any fluorescent system.
- Greater driver comfort.
- Uni-directional reflectors in parallel units aim light across street.
- Parallel fluorescent units, 18,600 lumens each; transverse unit, 18,600 to 55,800 lumens.

3

"POWER PACK"
MERCURY LUMINAIRE

NEW BUILT-IN BALLAST

- Only two terminal connections—saves up to 30 minutes per unit installation.
- Eliminates need for ballast-adapters or transformer-base poles—saves $30 to $65 per pole.
- Same outstanding lighting efficiency you have experienced with the General Electric Form 400—best in the industry.
- Low ballast losses.

in Outdoor Lighting from General Electric

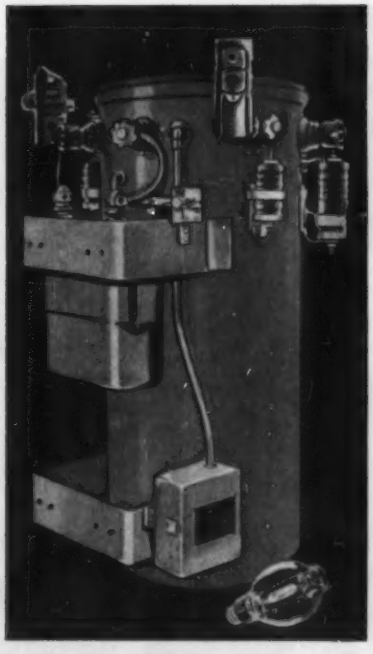
4

NEW FORM 400C MERCURY LUMINAIRE

ONE-PIECE REFLECTOR HOUSING

- New General Electric one-piece, anodized-aluminum reflector-housing.
- Lighter weight for easy installation and maintenance; larger volume for effective heat dissipation.
- Outstanding versatility; operates five lamps, provides four IES distribution types.
- With precision-molded glass refractor, provides unequalled photometric performance.

5



FOR 400-WATT SERIES APPLICATIONS

BALLASTLESS MERCURY SYSTEM

- New 400-watt mercury lamp with built-in cutout—*exclusive* G-E development gives reliable operation.
- *Packaged* substation-type regulator—another G-E *exclusive*, combines *all* control equipment in self-contained, pre-assembled package.
- Eliminates need for separate ballasts for series circuits.
- Reduces costs of installation, operation, and maintenance.

Check these EXTRA VALUES

for the complete story on General Electric's new Outdoor Lighting products

- 1 FORM 406 FLUORESCENT LUMINARE
- 2 "TEE-LIGHTING" FLUORESCENT SYSTEM
- 3 FORM 400 "POWER PACK" MERCURY LUMINAIRE
- 4 NEW FORM 400C MERCURY LUMINAIRE
- 5 BALLASTLESS MERCURY (SERIES CIRCUIT)

These five advanced-design lighting developments are headliners of more than a dozen new, redesigned products from General Electric. All are outstanding examples of General Electric product and research leadership. Each contains time- and money-saving features which mean EXTRA VALUE for you.

For full details, see your G-E Sales Engineer or Agent, or check the products you're interested in, fill out coupon and mail.

Section J450-4
General Electric Company
Schenectady 5, New York

Name_____

Company_____

Address_____

City_____ State_____

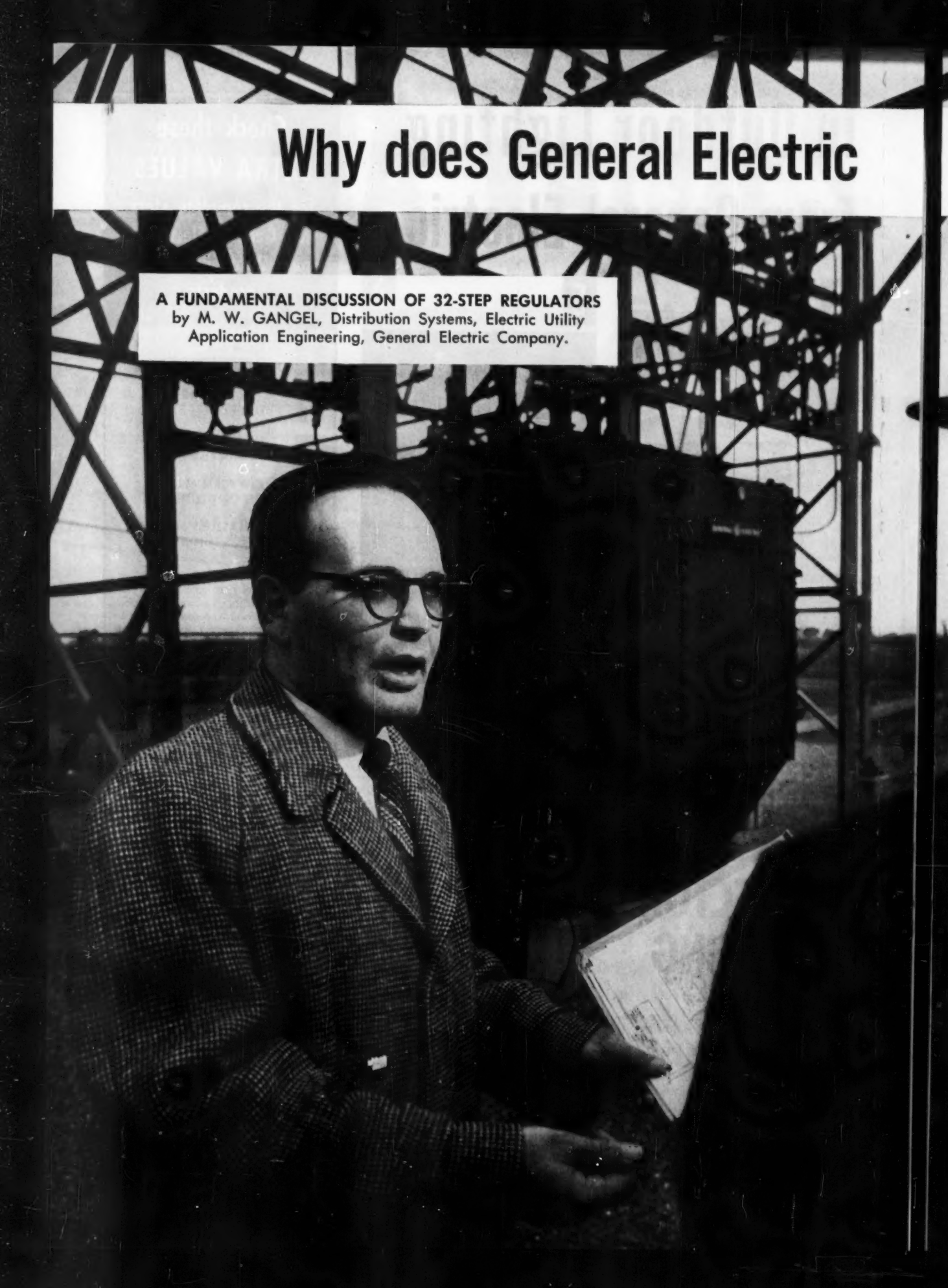
Progress Is Our Most Important Product

GENERAL ELECTRIC

Why does General Electric

A FUNDAMENTAL DISCUSSION OF 32-STEP REGULATORS

by M. W. GANGEL, Distribution Systems, Electric Utility Application Engineering, General Electric Company.



advocate 32-step regulators?

ANSWER: Because 32-step regulators offer three fundamental benefits which add up to extra profit:

1. **EXTRA FEEDER LENGTH**
2. **EXTRA FEEDER CAPACITY**
3. **EXTRA FEEDER REVENUE**

QUESTION: What characteristics of a 32-step regulator make possible these added benefits?

ANSWER: Basically, the step size. It is fundamental that with the smaller step size, the bandwidth can be narrower, regardless of any other considerations. The theoretical minimum bandwidth which can be set is equal to the step size. Under actual conditions, the minimum bandwidth is approximately 115 percent of the step size, plus an adder of from ½ volt to one volt, depending upon the type of control involved. This results in a minimum practical bandwidth setting of approximately 1½ volts for a 32-step regulator and approximately three volts for a 16-step regulator. The *difference of 1½ volts is a dividend in favor of 32-step regulators.*

QUESTION: Why do discussions of regulators lead to the topic of bandwidth?

ANSWER: Bandwidth is an economical source of extra volts . . . volts available for profitable re-investment. Volts used in bandwidth are not available for work out on the feeder. For every volt taken out of the bandwidth, the average voltage to each consumer is improved by ½ volt, and the minimum voltage to each consumer is likewise improved by one volt.

QUESTION: Where can volts from the bandwidth of 32-step regulators be re-invested for greater distribution system economy?

ANSWER: The 1½-volt dividend available only from 32-step regulators will allow additional growth on a feeder without exceeding acceptable voltage limitations. For example, with a permissible four-volt primary circuit drop, the 1½ volts taken from the bandwidth and put to work on the primary circuit permits a *load increase of 37½ percent.* If, on the same primary feeder, the feeder length is increased in an area of uniform load density, the 1½ volts taken from the bandwidth of 32-step regulators can be utilized to provide a *17-percent increase in feeder length* without exceeding the voltage limitations of the feeder.

QUESTION: Can these 32-step regulator advantages affect revenue?

ANSWER: Yes. Revenue is a function of the voltage level at the consumer location. The 1½ volts saved from the bandwidth of 32-step regulators increases the consumers' average voltage level by 0.75 volts. This important contribution to revenue can be calculated very simply by inserting local electric utility values into the following equation:

43.8* × Load Factor × Annual Peak KW × rate in dollars per KW-HR = R

R = Annual revenue which can be gained by utilizing the bandwidth dividend available only from 32-step regulators.

* The factor of 43.8 is the product of: 1) 8760 hours per year; 2) 0.5, which represents the assumed ratio of the amount of voltage-sensitive kw-hr load to the total kw-hr load; and 3) 0.01, the increase in each kw-hr of voltage-sensitive load corresponding to a 0.75-volt average voltage level increase at the consumer location.

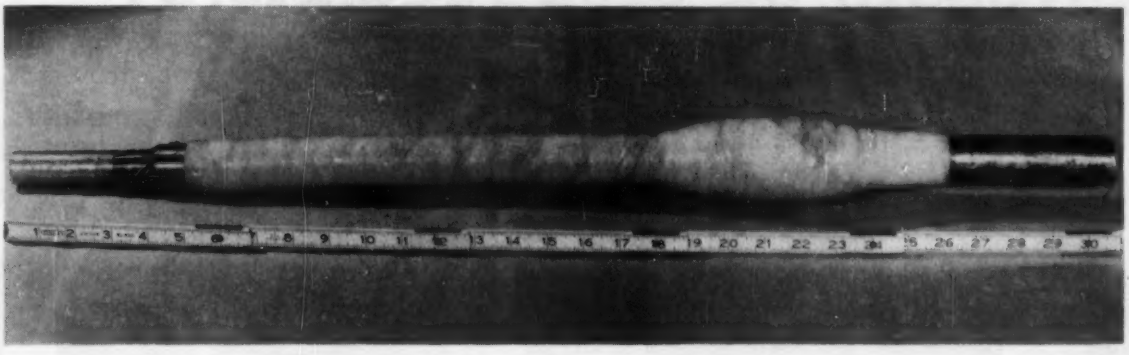
QUESTION: This means that it is quite easy to calculate direct savings from the benefits which the 32-step regulators provide?

ANSWER: Definitely. Simply by setting this reduced bandwidth utilities can begin accruing measurable benefits in terms of reduced system investment and increased revenue. This contribution to profit is one important reason why more General Electric ML-32 step regulators are in service today than any other kind. 423-40

YOUR GENERAL ELECTRIC SALES ENGINEER can give you further details which show why G-E 32-step regulators cost less on the line. General Electric Company, Schenectady, New York.

Progress Is Our Most Important Product

GENERAL ELECTRIC



Plastics Improve 33-kv Cable Terminals

JOHN J. RUECKERT, Senior Engineer, Baltimore Gas & Electric Co, Baltimore, Md.

Many of the difficulties associated with solid or semi-solid filled 33-kv potheads may be economically eliminated by using plastics such as those developed by the Baltimore Gas & Electric Co.

In recent years a solid pothead filling compound was used which resulted in a few failures because of compound shrinkage during cold weather and the considerable void space left upon initial filling. As an intermediate step, an elaborate shop job was developed using a semi-solid compound to produce an essentially void-free termination. The technique consists of preheating the termination to 175 F by repeated fillings of transformer oil, flushing the filling compound through the termination until no bubbles appear in the overflow, and then maintaining 30 psi pressure on the compound for at least 12 hr to compensate for shrinkage during cooling.

Substantial reductions in cost have now been achieved by a new method. Since June, 1958, it has been company practice to make an oil seal by wrapping epoxy-impregnated orlon tapes to a thickness of ¼-in. over the cable within the pothead from the cable sheath up to and over the lower portion of the high-voltage ferrule. The remainder of the pothead is filled with oil, allowing room for expansion. To prevent the heat of wiping from damaging the bond between plastic and lead, the pothead bell is extended slightly. Laboratory overvoltage and heat-cycling tests indicate the life of the termination to be greater than that of the cable. The limited field experience with this new type termination has been highly successful.

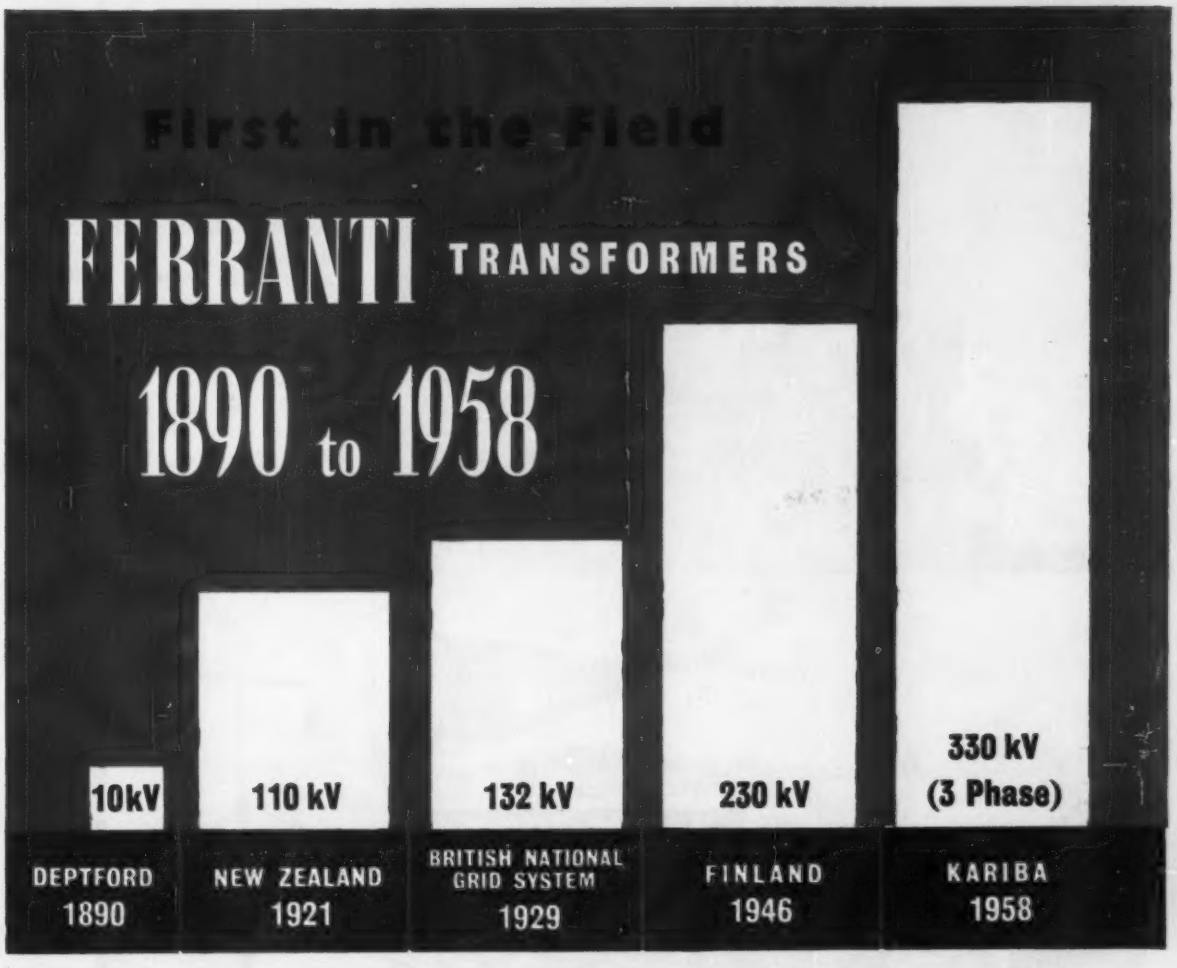
Silicone Grease Halts Insulator Fouling

Both Southern Nevada Power Co and the U. S. Bureau of Reclamation have found silicone grease effective as an insulator anti-contaminant coating. The grease has been successful for insulators up to 230 kv in a severe industrial atmosphere adjacent to a basic magnesium plant at Henderson, Nevada.

The silicone compound is usually applied by hand. Coated insulators in service nine months without washing showed satisfactory laboratory operation at twice rated voltage, dry, without arcing or breakdown. Wet operation was equally satisfactory.

Southern Nevada personnel are confident that the grease will give a service life greater than the one year necessary for it to be more economical than the previous method of repeated insulator washing. Removal and replacement of grease has been found quite easy.

The silicone compound has been effective against fouling by contaminants from the magnesium plant's alkali and metal production, which adhere easily to insulators and harden if undisturbed. The area's high humidity and seasonal storms, combined with the contamination, cause intense flashover activity unless the contamination is removed frequently or otherwise mitigated.



In the British Electrical Industry, Ferranti transformers are always first in the field thus satisfying the ever increasing demand for electric power.

The skill of Ferranti engineers over a period of more than 65 years has resulted in the award of contracts for the supply of transformers of the highest voltage and rating for the world's largest electric power projects.

Specify* FERRANTI *transformers famous throughout the world

FERRANTI LTD

Head Office: HOLLINWOOD · LANCS · ENGLAND

London Office: KERN HOUSE · 36 KINGSWAY · W.C.2

NEW YORK: Ferranti Electric Inc. 30 Rockefeller Plaza, N.Y. 20

TORONTO: Ferranti Electric Ltd., Mount Dennis, Toronto 15

HORTON: Manchester 10, England

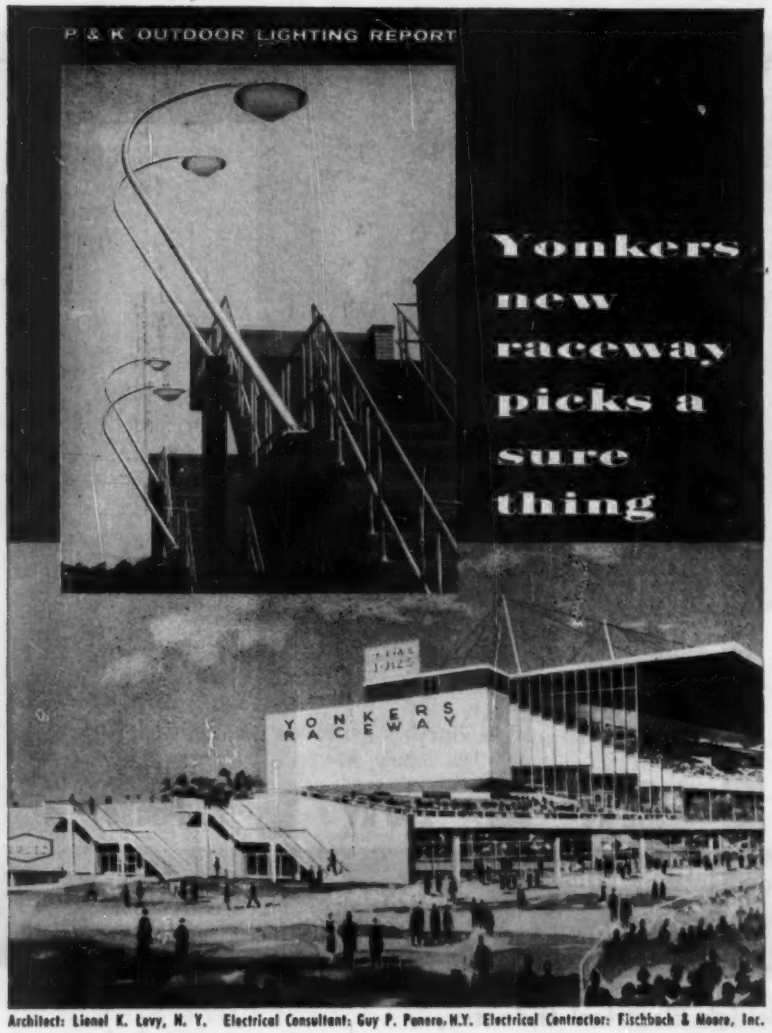
WYTHENSHAWE: Manchester 22, England

WEST GORTON: Manchester 12, England

GEM MILL: Chadderton, Lancs, England

EDINBURGH: Forty Road, Edinburgh 5, Scotland

DUNDEE: Kings Cross Road, Dundee, Scotland



Architect: Lionel K. Levy, N. Y. Electrical Consultant: Guy P. Panero, N.Y. Electrical Contractor: Fischbach & Moore, Inc.

CIRCLElux DAVITS LIGHT THE WAY

Here, at the country's newest and most luxurious track, P&K all-aluminum CIRCLElux davit-style lighting standards were chosen. Their natural functional beauty add a modern complement to the surroundings. For example, the units illustrated are 10 foot gracefully arched davits with our CIRCLElux fluorescent luminaire. CIRCLElux incandescent luminaires were used in other applications at the raceway.

The wide range of styles available, along with the choice of three lighting sources—incandescent, fluorescent, and mercury vapor—enables you to effectively customize any installation with a "package" unit, standard and luminaire, complete and ready for installation. This means easier specifying and easier installation, and it is good to know that P&K aluminum standards never require painting or other costly maintenance, keep their good looks for years and years.

For more facts send for bulletin LTG-30 describing the complete range of CIRCLElux lighting packages.

P&K

PFAFF & KENDALL 84 FOUNDRY ST., NEWARK 5, N. J.

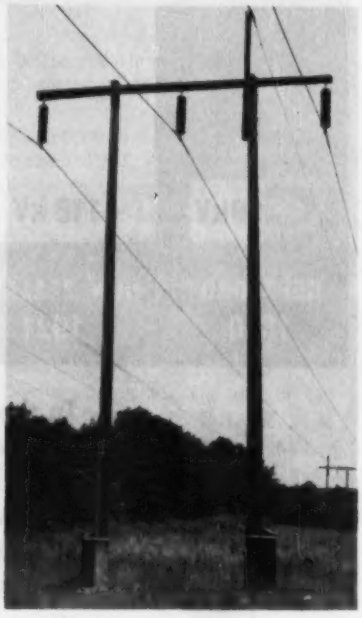
IN CANADA: POWERLITE DEVICES, LTD., TORONTO, MONTREAL, VANCOUVER

EXPORT REPRESENTATIVE: PHILIPS EXPORT CO., NEW YORK, N. Y.

Rebuilding H-Frames Saves Money

Virginia Electric & Power Co is reaping savings by rebuilding H-frames using bayonets and pole studs, rather than replacing structures. Use of these techniques for two 24-mile long 110-kv lines saves about $150,000.

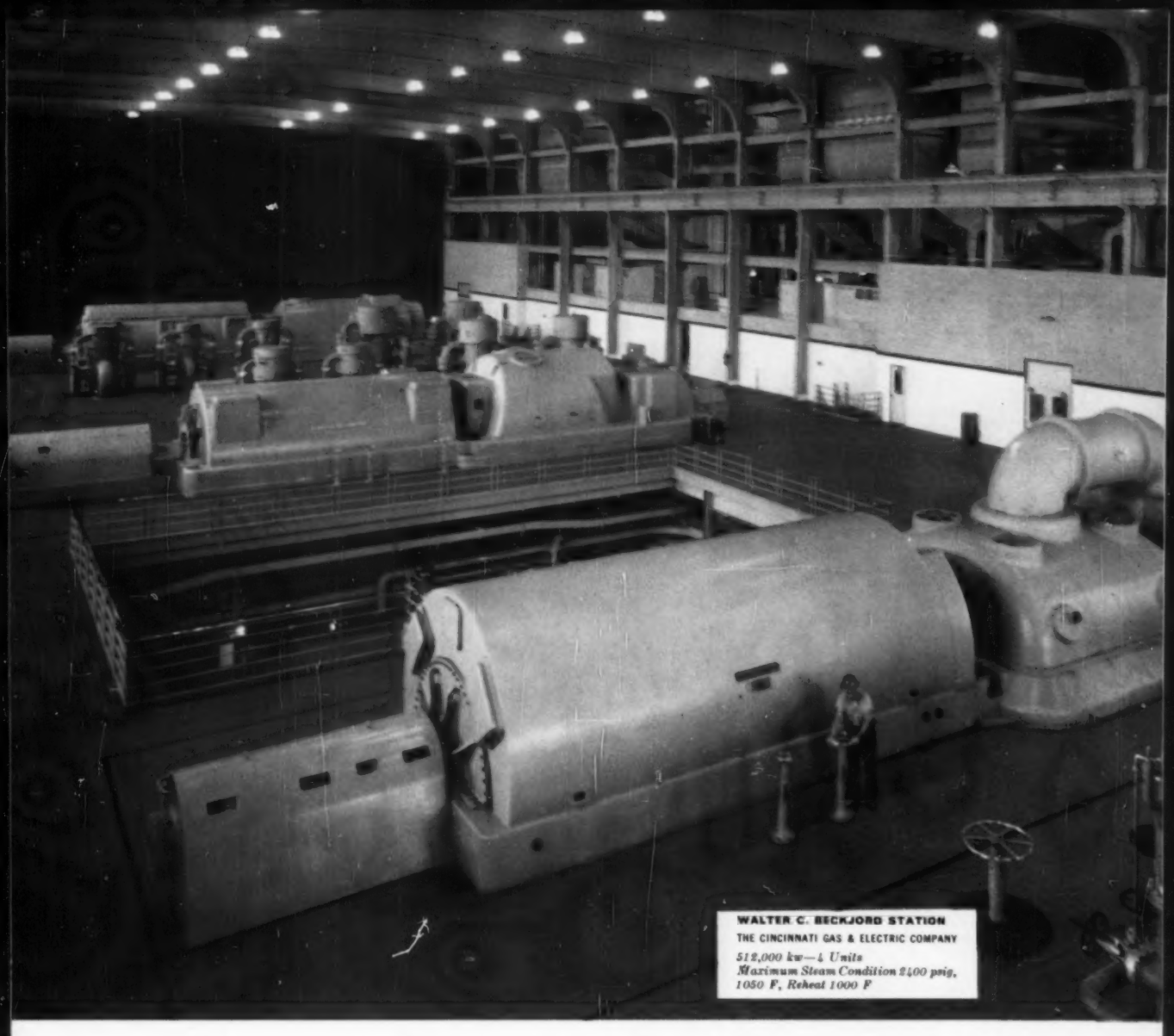
The lines each consist of 160 wood H-frame structures carrying three 266.8-MCM conductors. These conductors were replaced with 636-MCM ACSR, and one overhead shield wire was added.



Before the new conductors could be strung, about 23% of the structures had to be replaced, and another 35% were jacked out and stubbed to provide proper ground clearance. All structures not replaced were fitted with one bayonet on the top to carry the shield wire and provide satisfactory shield angles.

Vepco is using bayonets and pole stubbing wherever possible to reduce construction costs.

(*More How To on page* 62)



WALTER C. BECKJORD STATION
THE CINCINNATI GAS & ELECTRIC COMPANY
512,000 kw—4 Units
Maximum Steam Condition 2400 psig, 1050 F, Reheat 1000 F

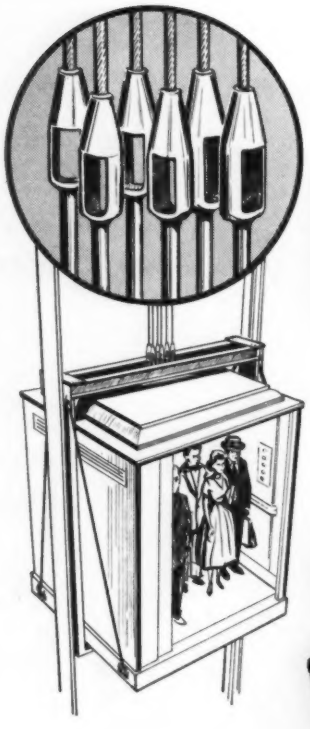
Power in Ohio...

Cincinnati and its surrounding area are powered by The Cincinnati Gas & Electric Company. Its Beckjord facility is unique among power stations. The plant is designed for river level fluctuations of some 70 feet and because it is inaccessible to railroad facilities, equipment and fuel are delivered by barge. Its landscaping and appearance testify to the company's civic pride. The Cincinnati Gas & Electric Company serves nine counties and over 1,300,000 people.

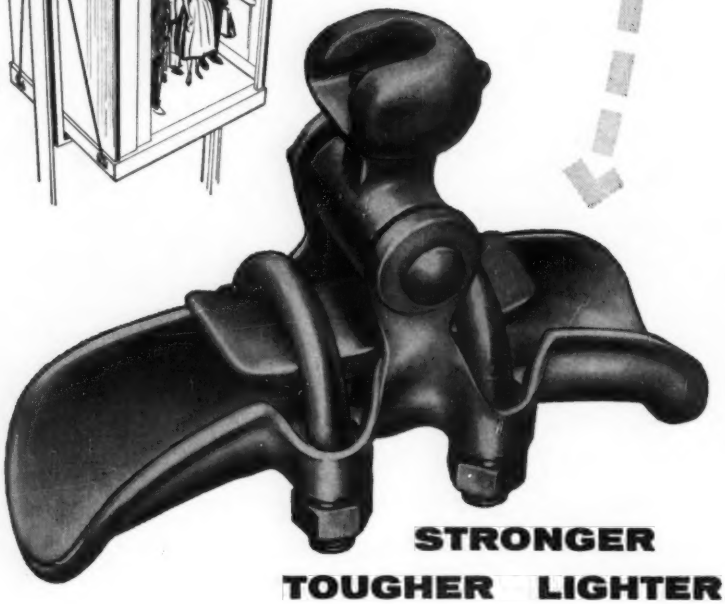
FULL COLOR BROCHURE outlining the scope of Sargent & Lundy services will be sent on request.

SARGENT & LUNDY
ENGINEERS

140 SOUTH DEARBORN STREET, CHICAGO 3, ILLINOIS



FORGED, *of Course!*



STRONGER
TOUGHER LIGHTER

BTC *Drop Forged* **Suspension Clamps**

Wide range of sizes
Dimensional fidelity—oversize clamps unnecessary
No failure under severe loading
No excessive wear on connecting surfaces
Specify the best—BTC Hi-Line Hardware

The BREWER-TITCHENER CORPORATION
HI-LINE HARDWARE DIVISION • CORTLAND, N.Y.

Davit, Hoist Help Handle Transformers

Davits mounted on trucks of San Antonio Public Service Board aid crews in handling transformers and other heavy materials which have to be loaded onto or removed from trucks. A hand-operated hoist is suspended from the davit and used for lifting transformers and materials. The hoist lifts and the davit then swings into or out of truck as desired.

The base pipe is 3 in. in diameter and the top section is of 2½-in. diameter pipe.

Steam Cleans Soot from Equipment

J. F. **PHELAN,** Division Chief Load Dispatcher,
E. T. **WOZNICKI,** Division Electrical Maintenance Engineer, Indiana & Michigan Electric Co, South Bend, Ind.

Portable steam cleaners, borrowed from automotive stations, can quickly remove carbon soot from buses and insulators in an emergency. The steam cleaners are normally used to clean dirt and grease from automobile motors, and

(*Continued on page* 66)

NEW!

NO LOAD TAP CHANGER* WITH *"FREE-ACTING"* ROTOR FOR AUTOMATIC, TRUE ALIGNMENT

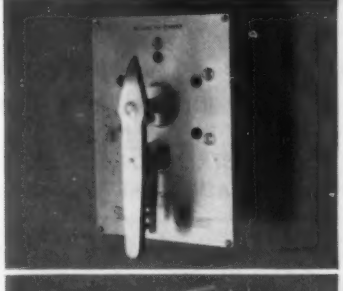
The new "self-aligning" tap changer now standard on all Kuhlman Substation Transformers puts an end to inefficient tap connections caused by misalignment.

The rotor contacts of the new tap changer function as a "free-acting" crosspin universal joint which eliminates the problem of misalignment between the rotor and stationary contacts. This "free-action" assures positive contact, true alignment always, and obsoletes the commonly used "flat surface" contacts which, by their construction, are subject to the faults of misalignment.

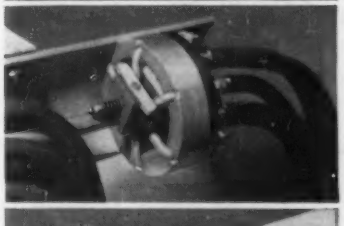
The new tap changer also features a new pistol-grip handle which locks in position and a quick-disconnect mechanism for simple, manual disengagement of the tap changer without the use of tools when untanking the core and coil assembly.

*patent applied for

Here's how the new Kuhlman No Load Tap Changer Works:



The pistol-grip trigger release allows the handle to be moved to the desired tap position. The trigger plunger then snaps solidly into position where it can be padlocked if desired.



The "free-acting" rotor contacts, functioning as a crosspin universal joint, eliminate the problem of misalignment between the rotor and stationary contacts.

Tap changer can be disconnected for removing the core and coil assembly by a tongue and groove mechanism located inside the tank.

Get all the advanced features offered with Kuhlman Substation Transformers. Write *today* for our new bulletin CS-701.

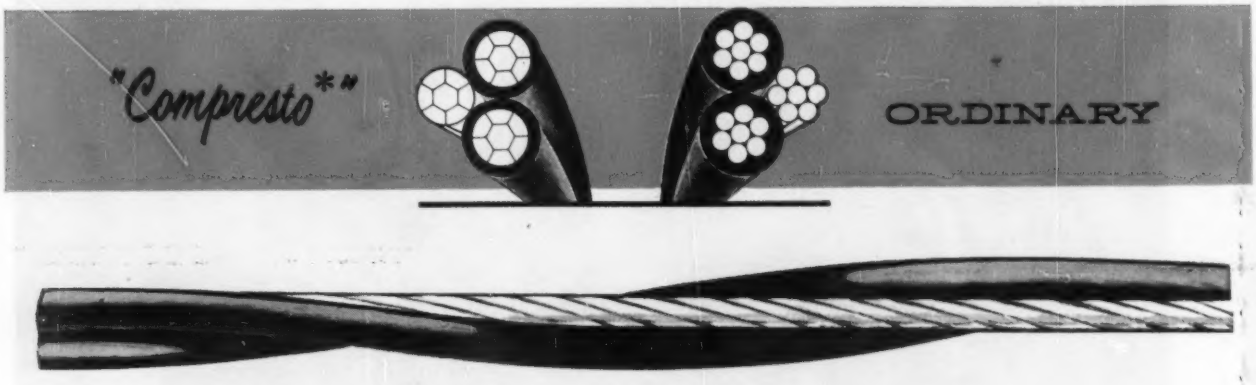
KUHLMAN POWER TRANSFORMERS

KUHLMAN ELECTRIC COMPANY General Offices: Birmingham, Michigan

BAY CITY, MICHIGAN • CRYSTAL SPRINGS, MISSISSIPPI • SALINAS, CALIFORNIA

"Compresto*Cable" WEIGHS LESS!

INCREASES SAFETY FACTOR IN ICE AND WIND LOADINGS!



TRIPLEX

Compresto* Triplex weighs less because the wire strands are compressed to a smaller diameter. Yet, Compresto has the same aluminum area and conductivity, and the same dielectric protection as ordinary cable! Reduces ice and wind loadings because it's smaller, yet just as strong!

EXAMPLE OF COMPARATIVE SAG AND TENSION DATA

ON #4 TRIPLEX S. S. SERVICE DROP CABLE ● 2 PHASE WIRES 7-STRAND ALL ALUMINUM
1 NEUTRAL 7-STRAND ALL ALUMINUM
ULTIMATE STRENGTH: 826 LBS. (BARE NEUTRAL) ● BASED ON 100 FT. SPANS
HEAVY LOADING AREA — 5th EDITION NESC — 1/2" ICE, 4-LB. WIND, K-.31

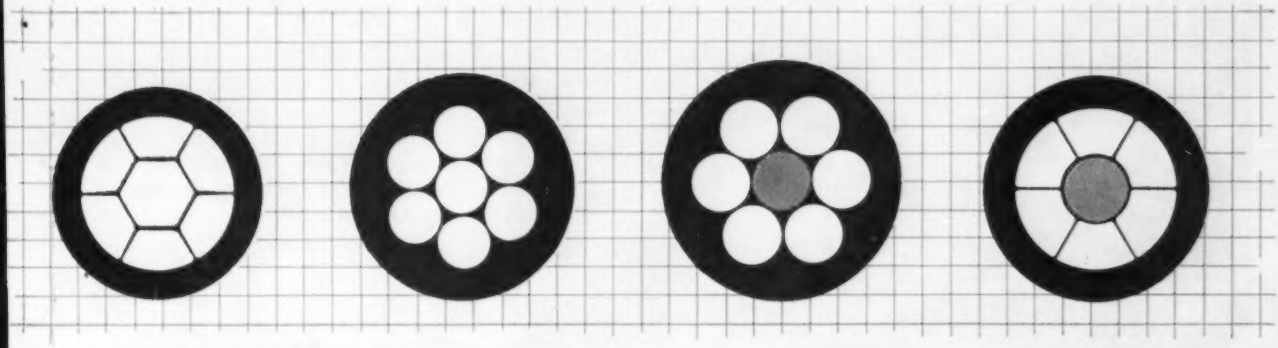
ORDINARY NO. 4 "TROUT" TRIPLEX 4/64" Neoprene Diameter of Circumscribed Circle, .714"					"COMPRESTO" NO. 4 "TROUT" TRIPLEX 4/64" Neoprene Diameter of Circumscribed Circle, .674"					"COMPRESTO" NO. 4 "OYSTER" TRIPLEX 3/64" Polyethylene Diameter of Circumscribed Circle, .576				
TEMP. FAHR.	INITIAL Tension Lbs.	INITIAL Sag Inches	FINAL Tension Lbs.	FINAL Sag Inches	TEMP. FAHR.	INITIAL Tension Lbs.	INITIAL Sag Inches	FINAL Tension Lbs.	FINAL Sag Inches	TEMP. FAHR.	INITIAL Tension Lbs.	INITIAL Sag Inches	FINAL Tension Lbs.	FINAL Sag Inches
0	Resultant: -		413	52.1	0	Resultant: -		413	50.5	0	Resultant: -		413	46.4
0	75	43.1	71	45.8	0	66	40.8	59	43.8	0	62	36.1	57	39.2
30	72	45.4	66	48.0	30	59	43.2	56	46.1	30	59	37.4	54	41.8
60	69	47.5	64	50.0	60	56	45.4	52	48.2	60	56	38.8	52	44.0
90	66	49.6	61	52.0	90	52	47.6	51	50.3	90	52	41.2	49	46.2
120	64	51.6	59	53.4	120	49	49.6	49	52.2	120	49	43.6	48	48.4

AVAILABLE IN DUPLEX, TRIPLEX AND QUADRUPLEX!

Compresto* Cable is available in the insulation of your choice. Neoprene: processed by Western Electric Company's Improved Room Temperature Method; Polyethelene; Two Coat rubber insulated, Neoprene Jacket. Available on our no-charge, non-returnable reels, or in standard coils or packages to your specifications.**

* Registered U. S. Patent Office
** Trademark

"Compresto *Cable"



COMPRESTO* ALL ALUMINUM | ORDINARY ALL ALUMINUM | ORDINARY ACSR | COMPRESTO* ACSR

5 REASONS WHY YOU WILL WANT TO USE "Compresto *Cable"

1. Adaptable to self-supporting service drop cable, or weather-resistant service wire.
2. The result of a special drawing technique that produces a flexible conductor of small diameter, yet maintaining the full aluminum cross-sectional area.
3. Has greater contact surface area for standard connectors, assuring full physical and electrical properties.
4. Affords the ultimate in resistance to installation damage, abrasion, compression cutting.
5. Eliminates the voids of an ordinary stranded conductor, reducing the weight without reducing the insulated wall thickness.

DEVELOPED AND MANUFACTURED BY

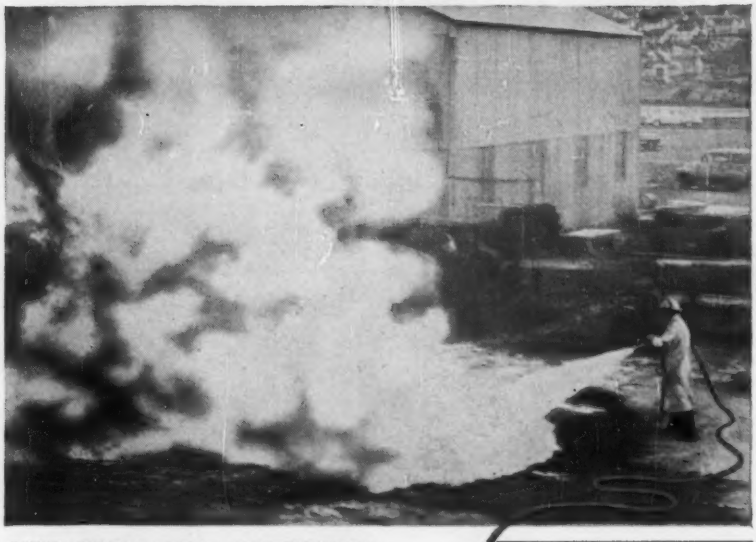
Southern Electrical Company

AMherst 7-6661 CHATTANOOGA, TENNESSEE P. O. Box 989

METALS DIVISION

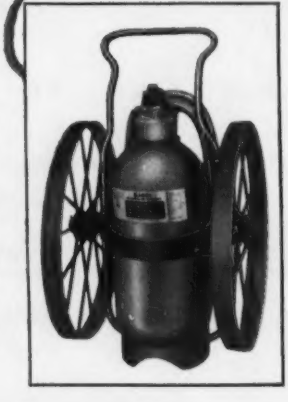
OLIN MATHIESON
Chemical Corporation

NEW! FOR FIGHTING LIQUID FIRES!



ONE-MAN DRY CHEMICAL KILLS MORE FIRE FASTER!

This new Kidde 200-pound pressurized unit has an *extra* 50 pounds of fire-smothering dry chemical, is designed for faster, easier operation. Its 40-foot stream gives more efficient extinguishing action, greater heat protection for the operator! No valves to unscrew, no wait for pressure, no pressure reducer to cause you trouble. Just remove safety pin, flip valve toggle, turn on nozzle lever. No conventional seal. Its exclusive Bridgeman seal holds pressure by using 450 psi to exert a *three-ton* sealing force.



COMPLETELY NEW DRY CHEMICAL LINE GIVES FASTER, EASIER OPERATION!

On the left, the new Kidde 20-pound dry chemical portable — completely new, completely better. The simplest, most efficient dry chemical portable on the market. Features include oversize aluminum handle for gloved-hand operation, perfect balance for faster action, simple one-two operation. Remove horn, pull trigger, and fire's out. Rugged, dustproof pressure gauge is recessed for protection. 10, 20- and 30-pound Kidde portables pressurized at 225-250 psi. Coming soon——new 2½- and 5-lb. models charged at 140-160 psi. Write today for information about this new Kidde line!

Kidde

Walter Kidde & Company, Inc.
1230 Main St., Belleville 9, N.J.
Walter Kidde & Company of Canada Ltd.
Montreal—Toronto—Vancouver

(*Continued from page* 62)

can often be rented at a reasonable cost to the utility.

Plain water is a satisfactory solvent, although a detergent would be helpful where extra cleaning power is needed. Use of the steam cleaner will significantly reduce outage time and labor costs.

When using steam cleaners, care should be taken to maintain a safe distance from any live lines or energized equipment. Avoid contact with any equipment or insulation that is not weatherproof.

In order to save time in an emergency, it is recommended that provisions for obtaining cleaners be arranged in advance.

Plastic Stops Corrosion, Cuts Costs

Coating spare steel parts with plastic prevents corrosion, thus cutting costs for New Orleans Public Service, Inc.

The plastic used is cellulose acetate butyrate. The solid material is placed in a thermostatically-controlled, portable, domestic-type electric roaster and melted at 350 F. Parts are either dipped into the liquid, or it is ladled on the parts. This results in a protective layer of plastic about $\frac{1}{16}$ in. thick, which dries in about a minute. The coating can be easily and quickly peeled off when the part is needed.

The electric oven proved superior to a metal drum heated by a gas burner, which was first tried for melting plastic. In the first method, the temperature could not be controlled accurately, nor could uniform heat be applied to the plastic.

OUR POSTAL ZONE NUMBER . . .

is New York 36, New York. Please include yours whenever you write a letter. Mail will go quicker, both ways.

HOLOPHANE

Lights the

BIG JOBS

•

HIBAY® Reflectors

For Every Type of High-Mounting Area

Holophane No. 640 Series...

Holophane engineers are constantly developing new and better equipment for all light sources... Here are some outstanding examples of Holophane *controlled* lighting—by the acre...In every instance one can see clearly for thousands of feet—with a maximum of visual comfort...Reason: the installation of Holophane HIBAY Reflectors... Advantages: prismatic design produces greatest utilization of illumination; metal covers protect reflectors; simplified construction assures easy installation and economical maintenance... Consult Holophane engineers, through architects and professional advisors, without obligation.

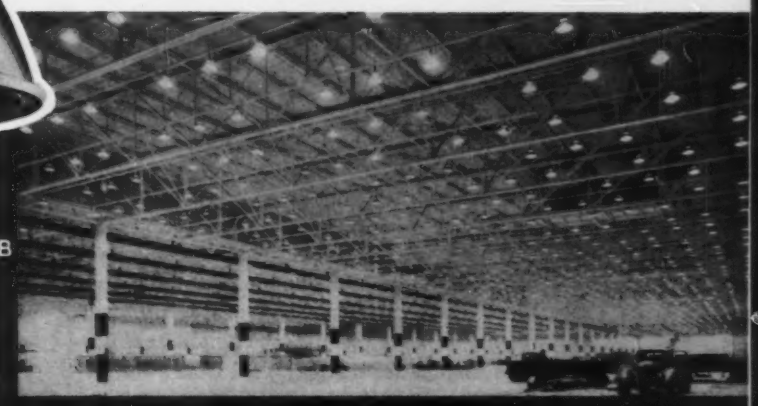
HOLOPHANE COMPANY, INC.

Lighting Authorities Since 1898

342 Madison Ave., New York 17, N.Y.

THE HOLOPHANE CO., LTD., 418 KIPLING AVE. SO., TORONTO 14, ONT.

For Better Lighting Holophane Be Sure It's



B

C

D

A. Dallas Memorial Auditorium, Dallas, Texas.
George L. Dahl, Architect & Engineer

B. Douglas Aircraft Company
Long Beach, California
Holmes & Narver, Inc., Architects & Engineers.

C. Louis Allis Company, Milwaukee, Wisconsin
Klug & Smith Co., Architects;
Uihlein Electric Co., Engineers

D. Allen County Memorial Coliseum,
Ft. Wayne, Indiana
A. M. Strauss, Inc., Architects & Engineers

Are you paying for not having full-load, full-voltage switching on your distribution feeders?

If you are opening your distribution feeders with rotating-insulator disconnects—of the two-insulator side-break or three-insulator vertical-break type—you are already *paying enough* to get full-load switching at full-line voltage (as distinguished from loop sectionalizing . . . load splitting . . . where the voltage across the switch is low).

By using S & C's Side-Break Alduti Load Interrupters, you can have arc-free 600-ampere load switching through 14.4 kv at the same price, or at a lower price than you are now paying. Ordinary disconnects can, at best, only partially handle loop sectionalizing (that is, switching currents in parallel or loop circuits), let alone properly handle full-load, full-voltage switching.

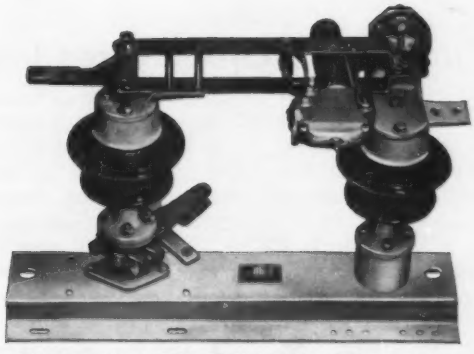
Why do you need this switching capability? There are two important reasons:

First—Emergency situations (wires down, etc.) demand quick action—dumping the load. And usually there is no time to set up communications for complicated breaker and switch sequencing.

Second—There's always the possibility of switching error, with the result that a loaded circuit may be inadvertently dumped.

If on the other hand, you are using budget-priced rocking or swiveling insulator disconnects, you may be saving on initial costs, but you are still losing the load switching capability you need. With these disconnects, or with rotating insulator disconnects, you will be paying *with trouble*—when you try to drop full load or when you try to open a heavily loaded loop.

LOAD INTERRUPTERS



Closeup view of S & C Alduti Load Interrupter (side-break style), 14.4 kv rating. May be mounted vertical, upright, or inverted.

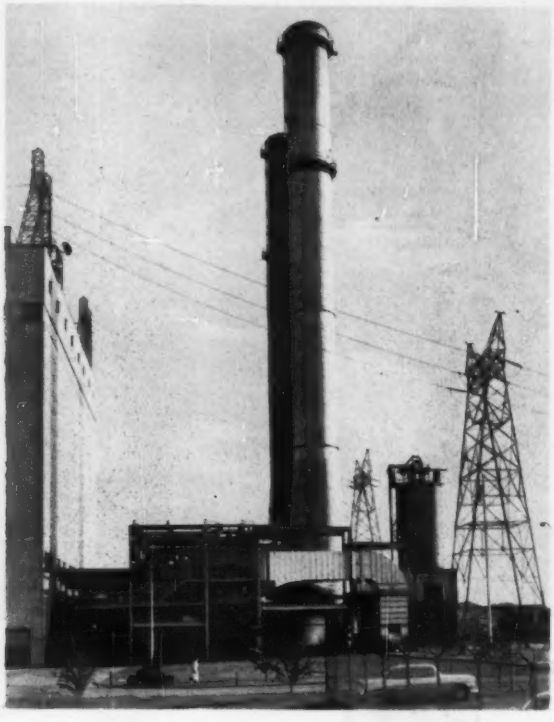
For full information about the S & C Alduti (side-break style) and other S & C Load Interrupters, write for Catalog Section 760, S & C Electric Company, 4421 Ravenswood Ave., Chicago 40, Illinois. In Canada: S & C Electric Canada, Ltd., 8 Vansco Road, Toronto 14, Ont.

S&C

Specialists in High-Voltage Circuit Interruption

Since 1910

Load Interrupters
LOADBUSTER®
Disconnects
Cutouts
Fuse Links
Power Fuses
Metalclad Switchgear



Stack Plume Invisibility Is Achieved by Koppers Co

Use of gas-cleaning equipment made by the Metals Product Division of Koppers Co, Inc, Baltimore, virtually frees smokestack in foreground of stack emission. Installation site is the Herbert A. Wagner Station near Baltimore, Md., latest of Baltimore Gas & Electric Co's electric generating plants. The stack carries a load of about 524,000 cu ft of gas per min. The first generating unit was in operation when this photograph (unretouched) was taken.

Koppers' electrostatic precipitators, located between base of stack and main building, in conjunction with mechanical dust collectors at single bin, remove fly ash from the gas stream.

The stack is used with equipment for a 125-Mw generating unit. A second stack (at rear) will be a similar installation.

The Wagner Station was put on the line early in 1956 and has been expanded. Within the past year, the plant has been doubled in capacity. When the new unit goes operative early in 1959, BG&E's total generating capacity will be over 1,000 Mw.

Smith Co Builds Wilson Dam Turbines; NEMA Scores Imports

A contract for three hydraulic turbines, each rated at 74,600 hp, to be installed at Wilson Dam was awarded to S. Morgan Smith Co of York, Pa. by the TVA Board. The company's evaluated bid was $2,815,950. The next low bid, from among three other domestic companies and one foreign company, was higher by $261,000, or 9.3%.

Contract for the three 60,000 kva hydro-generators to be associated with these turbines was let at the same time to Brown-Boveri Corp for $2,637,135, including $310,000 import duty.

Construction for the new turbine-generator installation at Wilson Dam will begin early in 1959 and is scheduled for completion in the Fall of 1961. Cost of adding the three units is estimated at $24 million, to be paid from revenues from power sales.

S. Morgan Smith Co, along with the four other manufacturers of hydraulic turbines in the U.S., have filed a brief with OCDM as member of the Hydraulic Turbine Section of NEMA calling on the federal government to bar imports of hydraulic turbines, under the Federal Trade Agreements Extension Act. The brief contends that the relationship between imports and the national security is of a critical, specialized nature in the case of hydraulic turbines and the American hydraulic turbine manufacturing industry.

NEMA Report

In presenting the case for banning imports of foreign hydraulic turbines, the 34-page NEMA report makes three fundamental points:

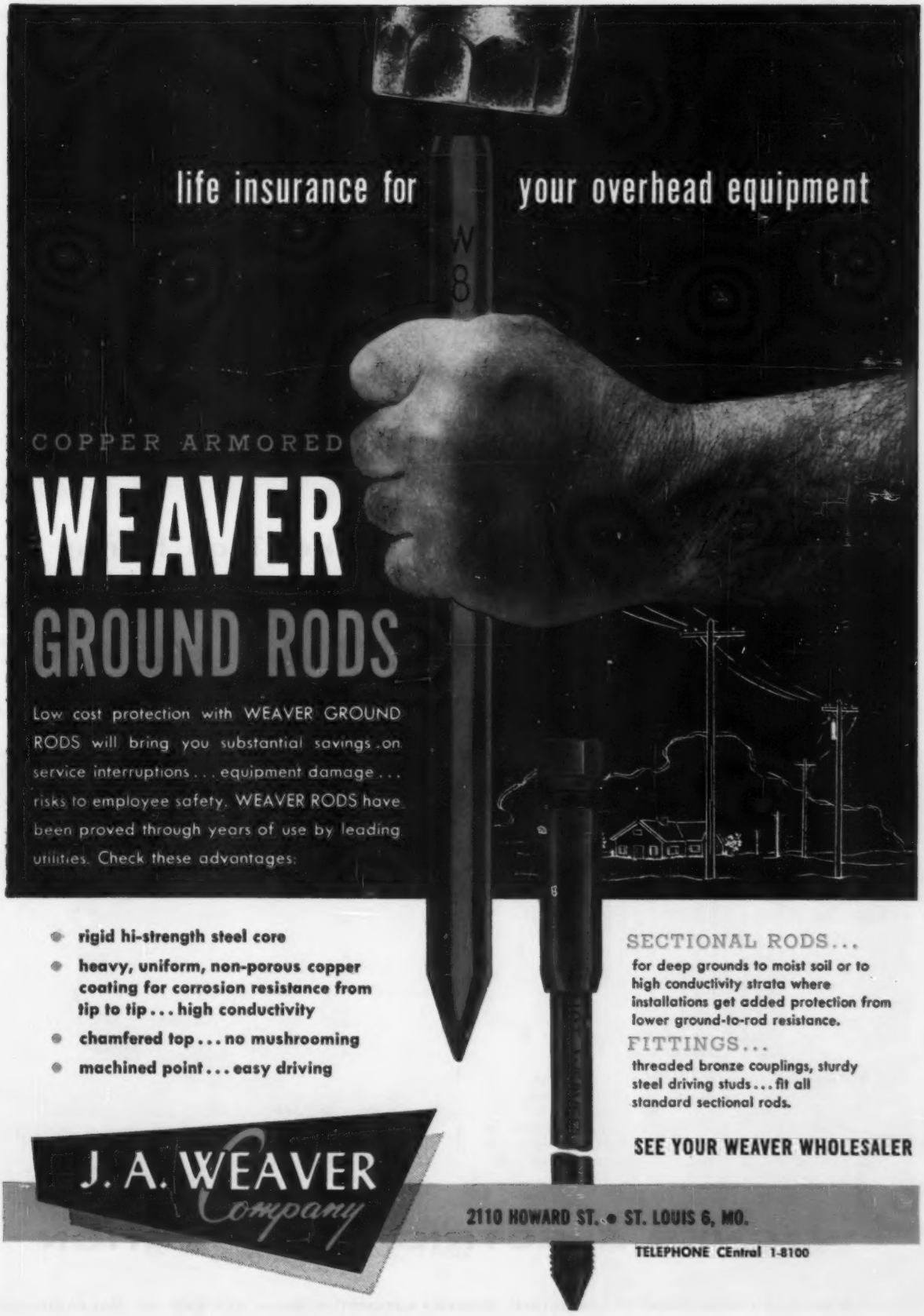
1. The technology and economy of the industry, the economic advantages of the foreign producers, and the resultant vulnerability of the industry to imports create obstacles that spell destruction of the U. S. hydro-turbine industry.

2. Imports of hydraulic turbines threaten national security. They create unnecessary and critical dependence on foreign sources of supply for the repair, maintenance and service of hydro-turbines, vital to defense preparedness and defense production.

3. Imports also threaten continuance of the engineering manpower, elephant tools, and plant facilities of the hydro-turbine industry which are essential to national security and defense production.

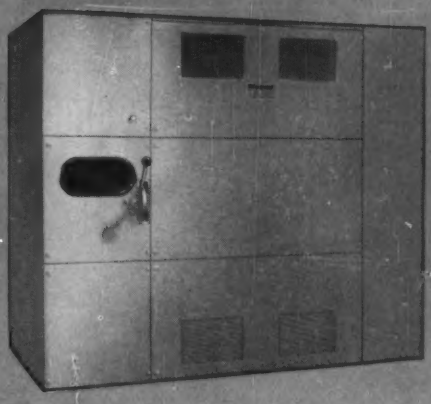
The report points out that the industry is not large, comprising only five turbine manufacturers. Annual domestic bookings average less than $27,000,000 with federal government purchases representing about 60% of total domestic bookings. Thus decisions reached by the government regarding foreign purchases of hydro-turbines directly

(*Continued on page* 74)

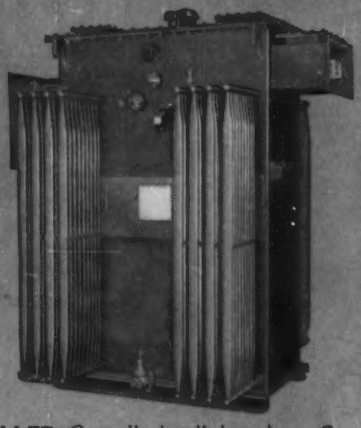

life insurance for your overhead equipment
COPPER ARMORED
WEAVER
GROUND RODS
Low cost protection with WEAVER GROUND RODS will bring you substantial savings on service interruptions . . . equipment damage . . . risks to employee safety. WEAVER RODS have been proved through years of use by leading utilities. Check these advantages:
rigid hi-strength steel core
heavy, uniform, non-porous copper coating for corrosion resistance from tip to tip . . . high conductivity
chamfered top . . . no mushrooming
machined point . . . easy driving
SECTIONAL RODS . . .
for deep grounds to moist soil or to high conductivity strata where installations get added protection from lower ground-to-rod resistance.
FITTINGS . . .
threaded bronze couplings, sturdy steel driving studs . . . fit all standard sectional rods.
SEE YOUR WEAVER WHOLESALER
J. A. WEAVER Company
2110 HOWARD ST. • ST. LOUIS 6, MO.
TELEPHONE CEntral 1-8100

Wagner **UNIT SUBSTATION TRANSFORMERS**

112½ to 2000 Kva—three phase, 60 cycles, 15 KV and below



VENTILATED DRY-TYPE—For indoor installation in reasonably dry, dust-free, well ventilated locations. Light in weight, ideal for multi-story buildings. No fire-proof vaults required. Insulated for 80°C temperature rise.

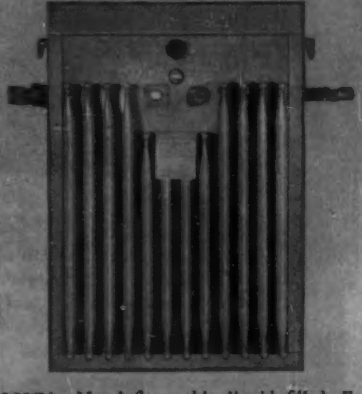


OIL-FILLED—Generally installed outdoors. Can be used indoors in fire-proof vaults. Outdoor transformers can be connected to indoor switchgear using weather-proof bus-duct. 55°C rise, self-cooled or forced-air cooled.

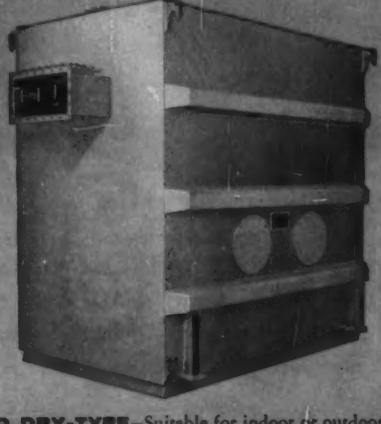
When you select a Wagner Transformer...

YOU GET THE TYPE FOR YOUR PLANT

PLUS... the assurance of continuous,



NOFLAMOL—Non-inflammable liquid filled. For indoor or outdoor installation, especially suited for chemical plants, refineries and similar locations where explosive liquids or gases are present. The close-coupled design illustrated fits flush against switchgear enclosures. Throat connected designs are also available. 55°C rise, self-cooled or forced-air cooled.



SEALED DRY-TYPE—Suitable for indoor or outdoor use, completely fire-proof, easy to clean and maintain. Sealed tank is filled with nitrogen under low pressure. Insulated for 150°C rise, self-cooled.

WAGNER ELECTRIC CORPORATION

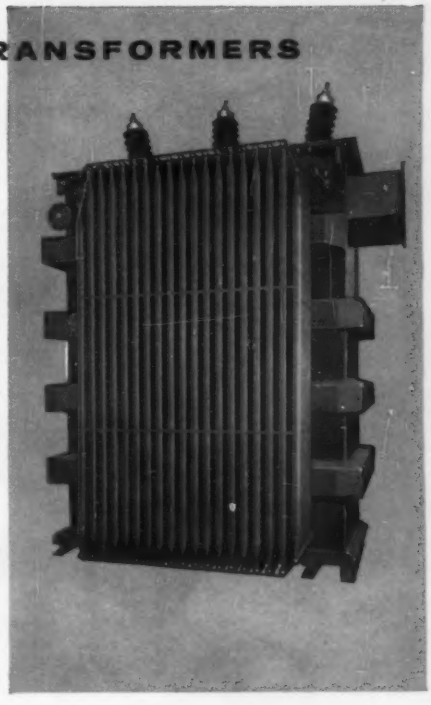
WT58-16

ELECTRIC MOTORS • TRANSFORMERS • INDUSTRIAL BRAKES • AUTOMOTIVE BRAKE SYSTEMS—AIR AND HYDRAULIC

Wagner **INDUSTRIAL POWER TRANSFORMERS**

Oil-filled, through 10,000 Kva, 67 KV and below.

Noflamol, through 7,500 Kva, 15 KV and below.



IF YOU are planning a new plant distribution system... modernizing your present one... or adding to its capacity to meet increasing demands for power... it will pay you to specify Wagner Transformers.

For your main plant substation, Wagner Liquid Filled Industrial Power Transformers are available in standardized ratings through 10,000 Kva.

For your load centers, Wagner can supply Unit Substation Transformers in any of the types shown at the left, furnished with suitable incoming line sections, to meet your particular requirements. These PREDESIGNED transformers will save you time and save you job engineering costs. You can specify the secondary switchgear you prefer.

BEST SUITED ELECTRICAL SYSTEM...

dependable service!

For plant areas requiring 120/240 volts, single-phase or 208Y/120 volts three-phase, Wagner Dry-Type Distribution Transformers are an economical choice.

All Wagner Industrial Transformers are liberally designed, sturdily constructed, thoroughly tested and able to meet the heaviest industrial demands. They assure continuous, dependable power for years to come.

For expert advice on your present and future plant transformer needs, call or write the Wagner branch near you.

Wagner **DRY-TYPE DISTRIBUTION TRANSFORMERS**

Single-phase 1 to 100 Kva—Three-phase 3 to 300 Kva—600 volts and below

Type AE, single-phase, 1 through 50 Kva, and Type AP, three-phase, 3 through 30 Kva, can be used for indoor or outdoor installation, larger ratings for indoor installations only. Ratings through 10 Kva single-phase and 30 Kva three-phase are designed for wall mounting, other ratings for floor or platform mountings.

Available for high voltages of 120 X 240, 240 X 480, 480 and 600 volts to 120/240 volts single-phase, and 480 and 600 volts to 208Y/120 volts three-phase.

Wagner Electric Corporation

6456 PLYMOUTH AVENUE, ST. LOUIS 14, MO., U. S. A.

BRANCHES AND DISTRIBUTORS IN ALL PRINCIPAL CITIES

Average-reading wattmeters, bi-directional power monitors

Sierra 185A-15FN Wattmeter

Terminate rf coax systems

Measure rf powers

Measure incident, reflected powers

Match antennas, loads

Sierra 164 Power Monitor

New convenience, simplicity, for terminating rf coaxial systems and measuring average rf powers is available with Sierra 185A series Average-Reading Termination Wattmeters. Frequency range 20 MC to 1,000 MC, accuracy of +5%, and VSWR 1.2 maximum. Three instruments cover, respectively, following power ranges and maximum dissipations: 0 to 5/15 watts, 15 watts; 0 to 30/100 watts, 100 watts; 0 to 150/500 watts, 500 watts. Conservatively rated, negligible rf leakage, ideal loads for CW, AM and FM transmitter and oscillator tests.

New convenience, simplicity for intermittent or continuous measurement of incident or reflected power is available with Sierra 164 series Power Monitors. Direct reading, accurate within ±5%, high directivity, low VSWR. Four plug-ins offer 1, 5, 10 and 50 watts full scale, 25 MC to 1,000 MC. Two additional plug-ins offer 10, 50, 100 and 500 watts full scale. A further plug-in covers 10 MC to 75 MC, 50, 100, 500, 1,000 watts full scale. No auxiliary power needed; power flow direction reversed by control knob at top of plug-in.

Write for complete details

sierra

Sierra Electronic Corporation

A Subsidiary of Philco Corporation

4696W Bohannon Drive

Menlo Park, California, U.S.A.

Sales Representatives in Major Cities

Purchase Hydro-Turbines

(*Continued from page* 70)

affect industry sales, the report concludes.

It was pointed out for example that loss of business in the award by the federal government of two Table Rock Dam contracts to foreign firms totaled $2,588,380 for the lowest American bidder. This was greater than the loss of 9% of the average annual domestic bookings for the entire U. S. hydroturbine industry and greater than 16% of the average annual bookings which the federal government has placed with the industry.

Participating with S. Morgan Smith Co in presenting the NEMA brief to the OCDM were; Allis-Chalmers Mfg Co, Baldwin Lima Hamilton Corp, The James Leffel Co, and Newport News Shipbuilding and Dry Dock Co.

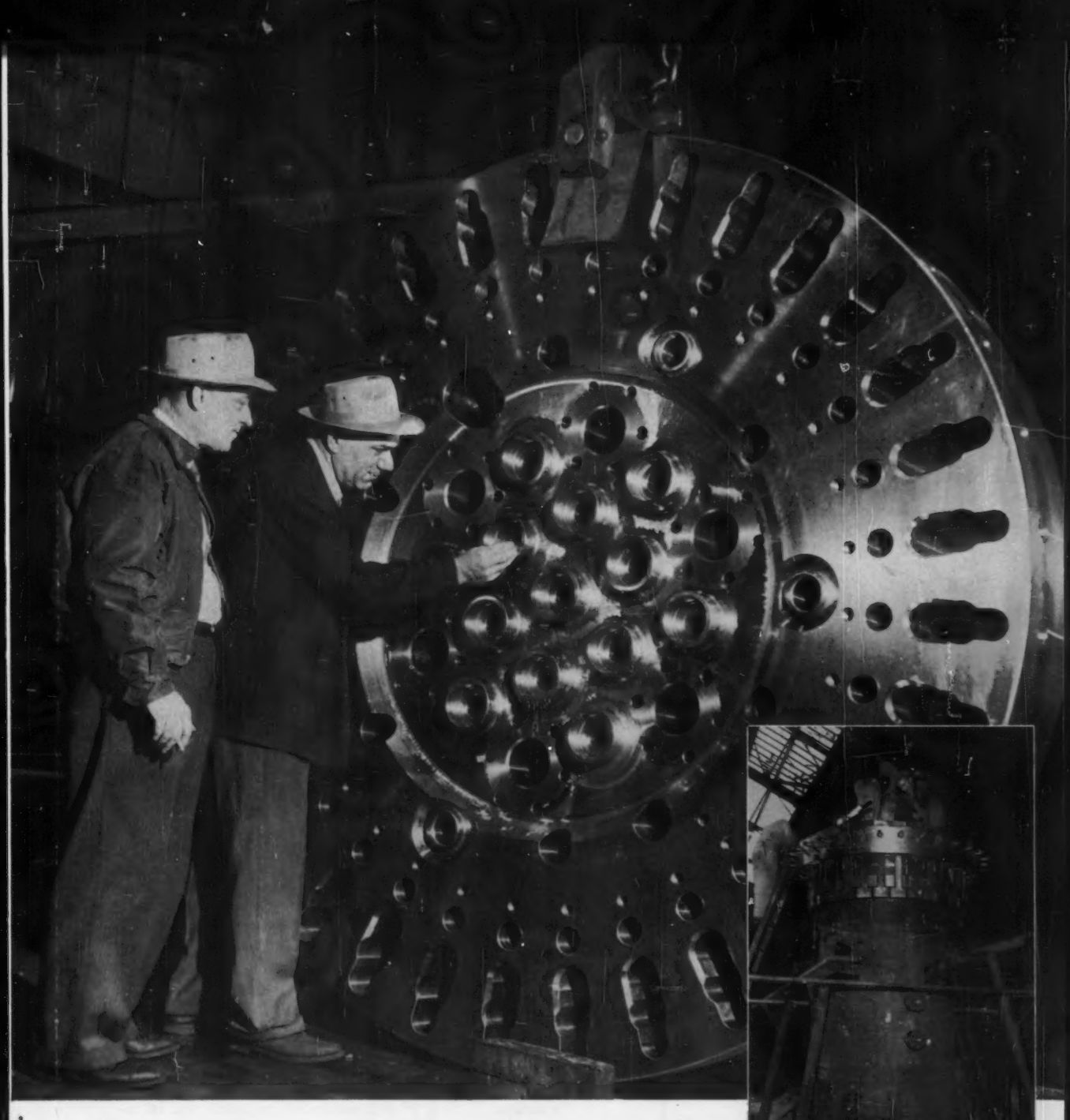
GE Broadens Product Use, Makes Changes in Facilities

Recent General Electric Co developments include newly designed equipment to broaden use of microwave products line, additions to facilities in one location, and termination of operations at another.

Designed for operation in the 6,000 mc frequency band, the equipment shown broadens the microwave products line built by the Communication Products Dept, at Lynchburg, Va.

Walter E. Sutter, GE's micro-

(*Continued on page* 76)



This pressure vessel had to be designed with a closure that would open in 30 minutes, and withstand 1500 psi, 550F. Made of Type 304 stainless, the top head has 34 connections, of which 19 required exceptionally close tolerances for control rods.

FOR NUCLEAR NEEDS of Knolls Atomic Power Laboratory, M. W. Kellogg was given the exacting assignment of designing and producing a 32½-ton "Proof Test Reactor Pressure Vessel". This was an unusually complex task, because of the quick-opening closure specifications, requiring a head with novel design and extremely close tolerance machining.

FOR NUCLEAR NEEDS of others, Kellogg is supplying the primary coolant stainless piping for two nuclear plants. In addition, Kellogg is equipped to engineer and manufacture heat exchanger equipment for nuclear energy power plants. If these specialized skills suggest a solution to *your* nuclear problems, call Kellogg's Fabricated Products Sales Division.

THE M. W. KELLOGG COMPANY, 711 THIRD AVENUE, NEW YORK 17.

A SUBSIDIARY OF PULLMAN INCORPORATED

The Canadian Kellogg Company Limited, Toronto • Kellogg International Corp., London • Kellogg Pan American Corp., New York
Societe Kellogg, Paris • Companhia Kellogg Brasileira, Rio de Janeiro • Compania Kellogg de Venezuela, Caracas

M KELLOGG W

I wish we had more time and personnel to prepare for this rate case!

Your staff is overloaded now. Call in the specialists and let them carry the peak load. HOW ABOUT PIONEER?

GIVE YOUR NON-ROUTINE OPERATIONS TO PIONEER

Design and Consulting Engineering Services

Pioneer has specialized in designing power plants for 56 years. It designs fossil fuel, hydro and atomic plants. It forecasts load growth, selects sites, purchases and expedites equipment and supervises construction. Pioneer's other services include substation, transmission and distribution studies and design.

Services in Regulatory Matters

Pioneer offers services in all phases of Federal, State and Local regulation including rate base, depreciation analysis, cost of service studies, market analysis, certificate proceedings and rate of return.

Corporate Services

Pioneer's services in corporate matters include business and management engineering advice, financial, accounting, tax counsel, insurance, and pension planning. It maintains a complete stock transfer, ledger and dividend disbursement service.

NEW!

On your letterhead, write for 40-page booklet, "Pioneering New Horizons in Power". Describes, illustrates Pioneer's engineering services, and corporate services, from financing to operation.

56 YEARS

Pioneer Service & Engineering Co.

231 South La Salle Street
Chicago 4, Illinois

GE Products

(*Continued from page* 74)

wave sales manager, pointed out, "For the first time microwave users can combine the advantages of 2,000 mc (existing line) and 6,000 mc equipment in their systems planning." The latter line offers 120 channels.

The company now offers both time division and frequency division multiplexing with its 6,000 mc products and will continue to supply time division with its 2,000 mc equipment.

The Computer Dept will shortly occupy its new 110,000-sq-ft manufacturing and general office facilities on Black Canyon Highway near Phoenix, Ariz. In addition to this facility, the Department plans to retain 50,000 sq ft for manufacturing purposes in a leased building in Phoenix in addition to its laboratory at Palo Alto, Calif.

Operations of the Air Conditioning Dept at Bloomfield, N. J., will be terminated on April 1, 1959. Manufacture of air conditioning products currently being carried on at Tyler, Tex., and Louisville, Ky., will be continued.

Delta-Star Schedules Tour With Insulator Display

A nation-wide, year-long tour with a mobile insulator display is scheduled by Delta-Star Electric Div, H. K. Porter Company, Inc, Chicago, Ill. Traveling in a compact, 2-wheel trailer, the exhibit will visit every city in which there is a Delta-Star branch office.

Upon arrival in each territory, the display will be set up in a hotel and interested engineers will be invited. Samples of all types of electrical porcelain and line hardware produced by Delta-Star's Thomas Works will be shown, as well as cut-away demonstrator insulators. A model distribution line will be strung between two utility poles, and working models of a flashover tester and impulse tester will be shown.

Starting January 1, 1959, the exhibit will head south and southeast from Chicago, touring up the Atlantic Coast, then to the middle west and over to the west coast.

• Southwire Galvanized Steel Strand

STRAND SIZE	5/8"	1/2"	7/16"	3/8"	5/16"	9/32"	1/4"	3/16"
WEIGHT PER 1000'	813 lb.	517 lb.	399 lb.	273 lb.	205 lb.	164 lb.	121 lb.	72.9 lb.
MINIMUM BREAKING STRENGTH IN POUNDS								
ASTM A-122-54T								
Galvanized (Single Galv.) Common	11600	7400	5700	4250	3200		1900	1150
Class A (Double Galv.) Common	11600	7400	5700	4250	3200		1900	1150
Class A (Double Galv.) Siemens-Martin	19100	12100	9350	6950	5350	4250	3150	1900
Class A (Double Galv.) High Strength	29600	18800	14500	10800	8000	6400	4750	2850
Class A (Double Galv.) Extra High-Strength		26900	20800	15400	11200	8950	6650	3990
Class A Utilities Grade, A.T.&T. and Western Union Spec.—7-wires		25000	18000	11500	6000*	4600		2400**
ASTM A-363-55T (No welds)								
Weldless High-Strength		18800	14500	10800	8000			
Weldless Extra High Strength		26900	20800	15400	11200			

*weight per 1000'—225 lbs. **weight per 1000'—80.3 lbs.

The infinite patience and skill used by the seafarer in stranding or splicing rope is matched by modern machines at Southwire.

Southwire Galvanized Steel Strand is manufactured to meet or exceed applicable ASTM specifications . . . and preformed to eliminate flared ends when sheared. Quality is our first concern, including premium-quality non-returnable reels on all reel shipments. Available in 250', *500' and 1,000' coils, 2,500', *5,000', 5,280' reels. Feel free to inquire about special packaging to suit your particular requirements.

Specify Southwire Galvanized Steel Strand for ground, messenger and guying applications, *shipped by our own fast fleet of trucks direct to your warehouse or jobsite.*

*Stock items

Southwire Company

Carrollton, Georgia—TErrace 2-6311

- Bare and Weatherproof Copper and Aluminum Line Wire
- Neoprene, Polyethylene, and VWP (Vinyl) Weatherproof Copper, Aluminum and Triplex
- U.R.C. (DBWP, TBWP) Copper
- Copperweld® Conductors
- Copper and Aluminum Building Wire
- ACSR and All Aluminum Cable
- Galvanized Steel Guy Strand and Static Wire
- Aluminized Steel Guy Strand and Static Wire
- Aluminum Alloy Wire
- Cable Accessories
- NM Sheathed Cable

• ALSO FABRICATORS OF COPPER AND ALUMINUM FOR WIRE AND CABLE MANUFACTURERS

Creative Selling Urged at SEE Meeting

Conference goers are warned they will have to step up sales programs in the residential field

A need for hard, creative selling, the ever-present importance of the consumer, and a close look at what the competition is doing, were some of major areas given top priority by the conference goers at the recent Southeastern Electrical Exchange General Sales Conference in Atlanta, Ga.

In the kick-off speech, J. J. McDonough, president of the Georgia Power Co saluted the new EEI all-electric program saying that if the industry gets behind it and supports it "progress and development for the future will be a reality."

In presenting the plans for the program, George W. Ousler, vice president of sales for the Duquesne Light Co said, "We can double the load because the potential is there." But, he warned, the load "will not drop in our lap. The program is needed to help us reach that goal."

J. J. McCarthy, consultant-marketing personnel training, General Electric Co saluted the power salesman with, "What this nation is today is the result of the efforts of the most effective sales force the world has ever seen . . . and high up in the list of productive salesmen are those employed in the many facets of the electrical industry."

Noting that discretionary spending is picking up steadily he asked, "Can it be attracted to channels of spending that will require more electric power consumption?" The answer lies, he said, in the kind of salesmen we develop.

The future of agriculture in the South and its effect on electric power consumption was discussed by Foy Helms, agricultural economist for Alabama Polytechnic Institute. He pointed out the conditions existing there today.

He also noted that if agriculture continues to improve, the use of electrical energy will expand more rapidly than it ever has before.

How Mr. and Mrs. Customer feels about their local electric company was detailed by Dr. Virginia Miles, vice president, client service, Market Planning Corp.

1. The utilities sell something that is essential to life and they cannot live without it.

2. They are resentful of the price they must pay because they think of electricity as a natural product.

3. There is nothing to make the consumer actively appreciate electricity—the only time he notices it is when it is not there.

4. Can't understand the utility bill.

5. Good services and low rates are something the electric company owes them.

Dr. Miles said, though, that different public utilities can have different public images or personalities, depending on their own efforts. These images stem from the goals and practices each company has set for itself, and from the content and impact of their advertising.

Expand Sales Efforts

These are the words of W. M. Shepherd, vice president, Arkansas Power & Light Co.:

"The utilities must take a hard look at their sales plans and programs for the coming year. They must share, with other industry, the responsibility for accelerating recovery trends by increased sales. For many this means greatly expanded sales efforts, broader sales programs, additional manpower and more intensive sales promotion programs," he said.

Robb M. Winsborough, vice president, Middle West Service Co, pointed out that the attitude of the people is very important to utilities. "We face very serious and very real and difficult problems which relate to people, he said, and noted three serious and dangerous problems to utilities which are 'people-caused problems.'"

They are: In the last 30 years the share of the industry which has fallen into government ownership has increased from 7 to 25%; the rural co-ops are surrounding company's service areas; and the Federal government is launched on a program of construction of atomic electric power plants.

Calling for creative selling, Richard J. Sargent, vice president of Westinghouse Electric Corp, said we are on the threshold of another great creative era. The job of the electrical industry is applying the job of creative selling to the mass marketing that must be done today.

This is being carried on in the industrial and the commercial modernization fields.

But there is a job to do in the residential field, he pointed out. The three needs of creative selling there are: Making new homes all-electric; modernizing old ones into all-electric homes; and setting new high standards of electric appliance service.

Reaching Predicted Goals

Fischer Black, Publisher and Editor of Electrical World, wrapped up the conference with a close look at industry forecasts and the possibility of utility sales reaching predicted goals.

"Our predictions for the economy for the next ten years provides an environment which if taken advantage of by the electrical industry will permit an increase in electrical energy sales of 700 billion kwhrs compared with 325 billion in the past ten years," he said.

He pointed out the residential market can be conquered by:

- Encroachment on the gas industry's territory for heating and cooling installations
- Modernization of the some 20 million homes with completely inadequate electrical conveniences
- Willingness of utilities to promote new ideas such as the electric automobile.

(A round-up of the committee meetings will appear in the next issue.)

FLORIDA'S LUSTY GROWTH CASCADES INTO 1120 MW OF NEW GENERATION

PHOTO COURTESY CITY OF MIAMI NEWS BUREAU

WESTINGHOUSE AIDS FLORIDA POWER & LIGHT COMPANY IN PROVIDING POWER FOR CHANGING, GROWING ECONOMY. Serving 463 Florida communities, the Florida Power & Light Company is currently facing load growth on the order of 50,000 new customers year after year. Florida Power & Light Company is at a mid-point in a huge expansion program, more than doubling its system generating capability and adding 1120 mw in a four-year period, 1957-61. To meet this onslaught of new load, Westinghouse coordinated project planning service is assisting this utility plan and build new plants and plant additions. The story of this expansion program, and specifically of the new Westinghouse units 4 and 5 at the Lauderdale Station, is told on the following pages. (Top) Florida Power & Light Company's generating station, Fort Lauderdale, units 4-5.

YOU CAN BE SURE...IF IT'S Westinghouse

WATCH "WESTINGHOUSE LUCILLE BALL-DESI ARNAZ SHOWS"—CBS TV MONDAYS

Lauderdale's unit No. 4 went on the line in December, 1957, unit No. 5 in April, 1958, and the new Fort Myers unit started operation last November. The completion of these units marks an approximate mid-point in Florida Power & Light's four-year expansion program.

Florida's manufacturing interests include missile components, aircraft instruments, pleasure craft, fishing tackle, aluminum fabrication, precision machine tools, electronics and many others. ▶

In addition to Florida's influx of new permanent residents, average kilowatt hour consumption per home has risen 96% in the last 10 years. Photo courtesy City of Miami News Bureau. ▼

FOUR-YEAR PLAN WILL DOUBLE GENERATING CAPABILITY...

Florida Power & Light system meeting demand of 1000 new customers every week

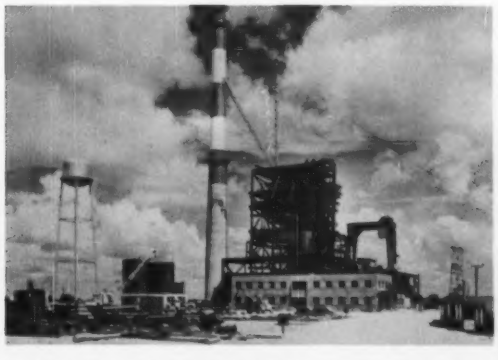
Meeting this uprush of load, Florida Power & Light Company will have added 1,120,000 kw to its generating capability from 1957 to 1961, bringing its system total to 2,122,000 kw. Unit No. 5 at Lauderdale and the new plant at Fort Myers have been put in service in 1958. An addition to the Sanford plant is scheduled for completion in May, 1959. Port Everglades is to be the site of a new generating station. One unit with a nameplate rating of 200,000 kw is to be completed in the spring of 1960; a duplicate unit will go in service one year later.

Thriving commerce and manufacturing now rival tourist trade... Florida Power & Light Company meets boom in permanent load growth

While sunshine is still Florida's biggest single asset, this vacation state is becoming less dependent upon this factor as its economic bedrock. Although permanent population is growing at the astounding 10-year rate of 69%, a more balanced economy is rapidly emerging. Florida is now No. 1 in the nation in gain in manufacturing employment. In the past two years, 1100 new plants have sprung up. From a broad array of activity, Florida's industry is now the leading source of the state's income dollar.

All this adds up to an 8.2% gain per year in new electric customers . . . a rate that again is first in the country. This is permanent growth, based on a strong and expanding three-way economy . . . agriculture, tourism, industry. Florida Power & Light Company is meeting this flourishing growth with ambitious planning, swift system expansion.

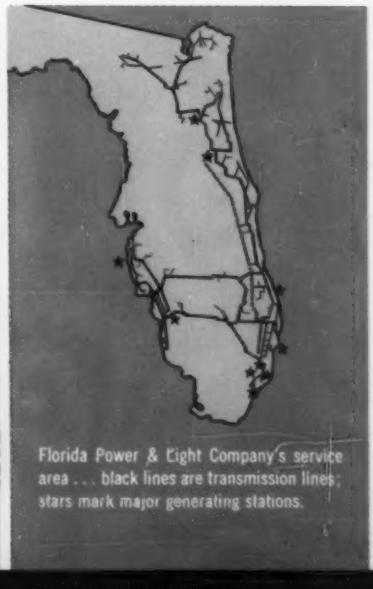
YOU CAN BE SURE... IF IT'S Westinghouse



TWO NEW STATIONS WILL BRING ADDITIONAL CAPACITY

Fort Myers' new station becomes one more block of generating capacity supplied F. P. & L. by Westinghouse.

Pile driving operations begin for Port Everglades Station to go on the line in 1960-61.



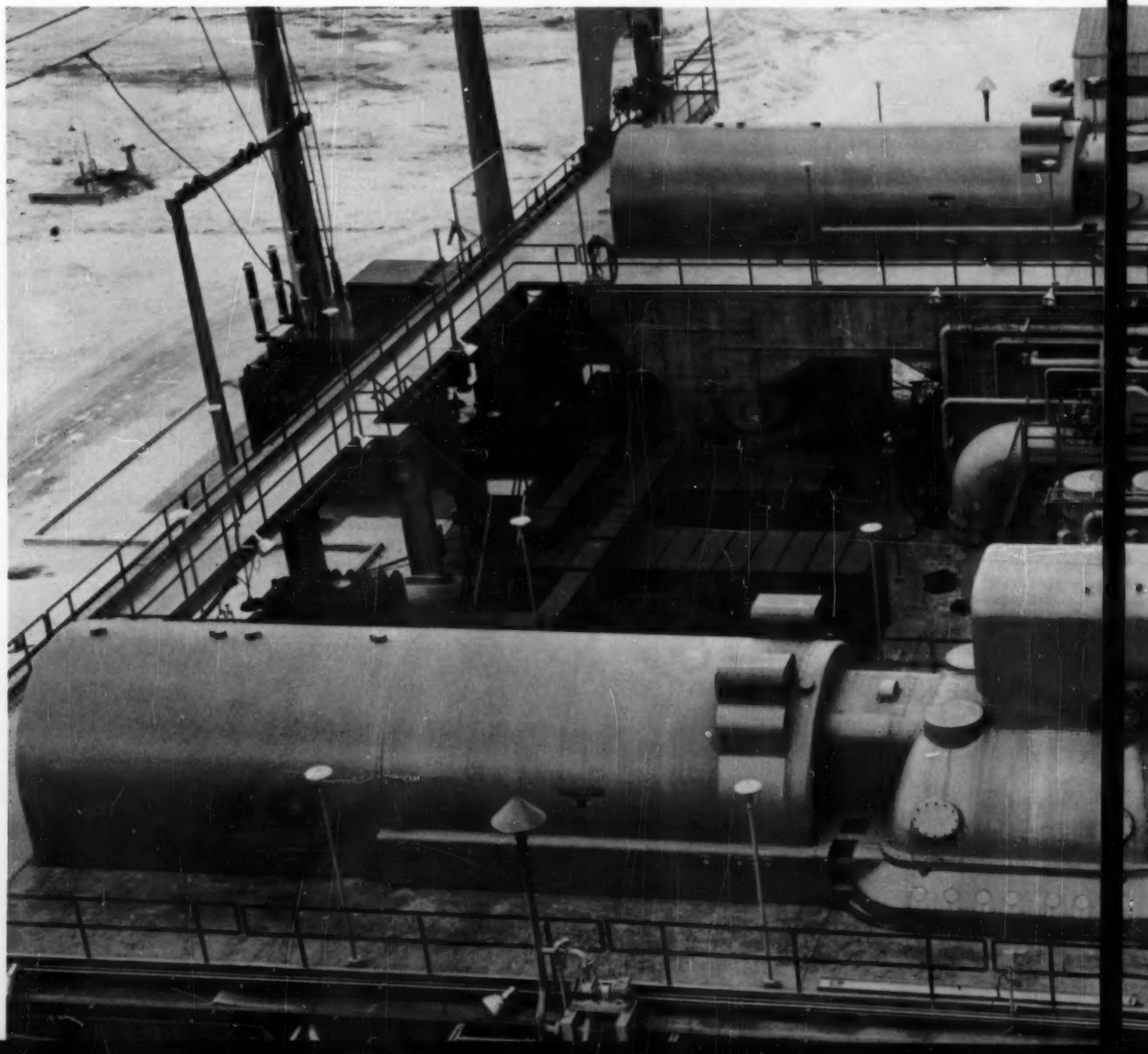
Florida Power & Light Company's service area . . . black lines are transmission lines; stars mark major generating stations.

LAUDERDALE STATION ADDS TWIN WESTINGHOUSE TURBINE-GENERATOR UNITS...

Largest single six-month expansion

Outdoor-type station construction, considered ideal for sites such as those found on this peninsula, frames turbine-generators No. 4 and 5. These Westinghouse tandem-compound, 3600-rpm units have a nameplate rating of 125,000 kw. This station presently uses oil for fuel but can be converted to gas. Station cooling water is obtained from a system of canals; water, through a series of locks, comes from Lake Okeechobee to the north.

Westinghouse coordinated and supplied all major equipment for these twin units. Since initial start-up of unit No. 5 in May, this station has been under full load.

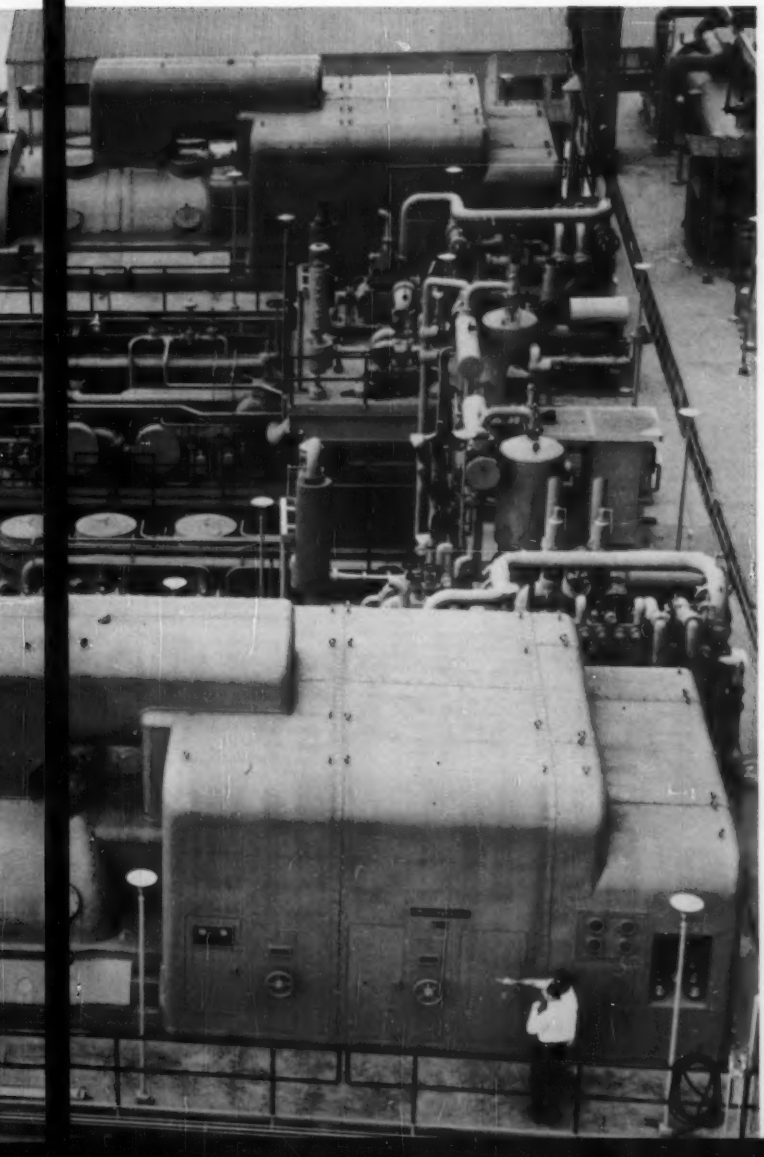


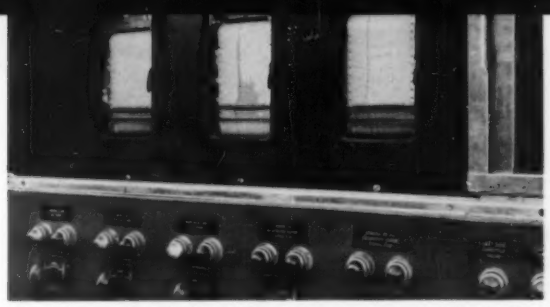
Generator equipped with exclusive Westinghouse hydrogen Inner-Cooling

Hydrogen Inner-Cooling, already proved in extensive service, is the simplest and most effective method of generator cooling ever devised. Heat is dissipated by circulating hydrogen through the inside of the rotor and stator windings in intimate contact with the conductors where heat is generated.

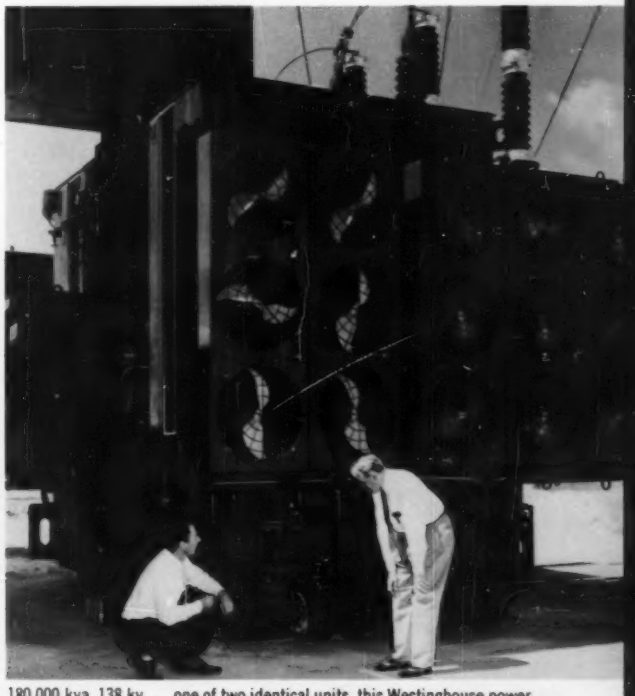
Secondly, Thermalastic® insulation provides the most effective protection for the generator . . . this mica-structured insulation system permits expansion and contraction of windings without injurious deformation, thereby extending the life of the machine.

YOU CAN BE SURE...IF IT'S Westinghouse



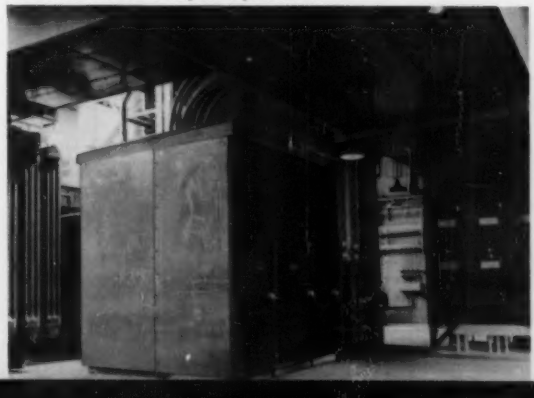


The designers of Lauderdale Station have chosen to mount the turbine supervisory instruments within a few feet of the turbine in outdoor, weatherproof enclosures. These units are Westinghouse Type 44 strip chart recorders. Their reliability of performance has long been recognized by the industry . . . well within ASA C-39.2 standards for 1% accuracy. Recent improvements include (1) illumination available direct from 120-volt line, (2) easy chart-speed changing while instrument is operating.



180,000 kva, 138 kv . . . one of two identical units, this Westinghouse power transformer features the Form-Fit®, shell-form design with forced-oil cooling. Superior mechanical and dielectric strength, the still unexcelled cooling arrangement, and reduced size and weight are a few of the outstanding benefits of this exclusive design. Extended service life, increased safe overload capacity, reduced maintenance and lowered installation costs over the years have been translated into a proved saving of over $100,000,000 to the electric utility industry.

Connecting generator and transformer, this Westinghouse segregated phase bus provides complete mechanical and electrical protection. Metal-enclosed construction insures safety to all personnel.



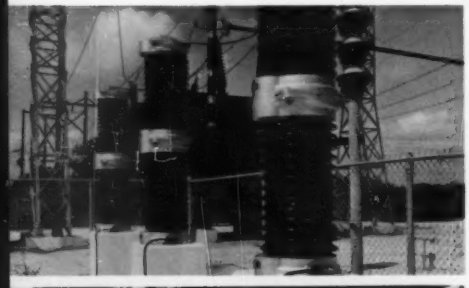
A bank of 69-kv, Type GM Westinghouse power breakers installed in the Lauderdale switchyard.

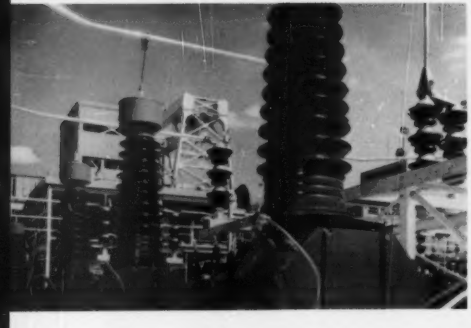
(below, top to bottom)

These Westinghouse SVS arresters are self-supporting and thus easier, less expensive to install.

Primary advantage of this Type V, 69-kv switch is the new Westinghouse quick-break arcing horn, safely interrupting primary circuits under load. This is especially important for the 2000-amp current-carrying capacity required of these switches at Lauderdale. 45° mounting of units takes advantage of existing overhead structure.

These Westinghouse Type OPT potential transformers are representative of the high degree of accuracy and reliability in metering and relaying required for Lauderdale's new 138-kv transmission lines. The rolled-on bushing hardware and all welded coastal-finished tank contribute greatly to the maintenance-free record of thousands of Westinghouse Type OPT transformers.





LAUDERDALE'S 5,000,000-KVA INTERRUPTING CAPACITY UNPRECEDENTED

Westinghouse power breakers set industry standard for 69-kv circuit protection

Florida Power & Light Company specified—and for the first time anywhere—69-kv power breakers with an interrupting capability of 5000 mva to meet requirements of increased capacity on transmission circuits. Proximity of load, presenting unusually low impedance, results in larger fault magnitudes. The new Westinghouse tubular grid interrupter is responsible for this tremendous increase from the previous 3500-mva standard.

These floor-mounted Type GM breakers have still another advantage . . . extreme ease of maintenance. Contacts can be inspected quickly in the tank, without removing grids from the bushings.

In this trend to higher interrupting capabilities, Westinghouse is already taking steps to provide 69-kv equipment rated at 7500 mva.

Westinghouse explosion-proof arresters provide outstanding switchyard protection

The high fault current available at the Lauderdale plant makes the explosion-proof feature of the Westinghouse SVS, 121-kv lightning arresters of significant importance. In the event the arrester is damaged and cannot clear power follow current, the unique arc transfer method vents arc outside in less than one-half cycle. This device releases the tremendous pressure of a full system short circuit current, prevents destruction of the arrester and scattering of porcelain which can seriously damage adjacent equipment or cause outage. Here is just one example of extra margins of safety built into all Westinghouse station-type arresters.

YOU CAN BE SURE...IF IT'S Westinghouse

Florida Power & Light's Assistant Plant Superintendent, L. E. Cooke, and R. P. Radford, Area Manager for Westinghouse, inspect newly installed outdoor, metal-clad switchgear, controlling motors for station service. Ideal for Florida weather, this switchgear's finish and undercoating prevent corrosion.

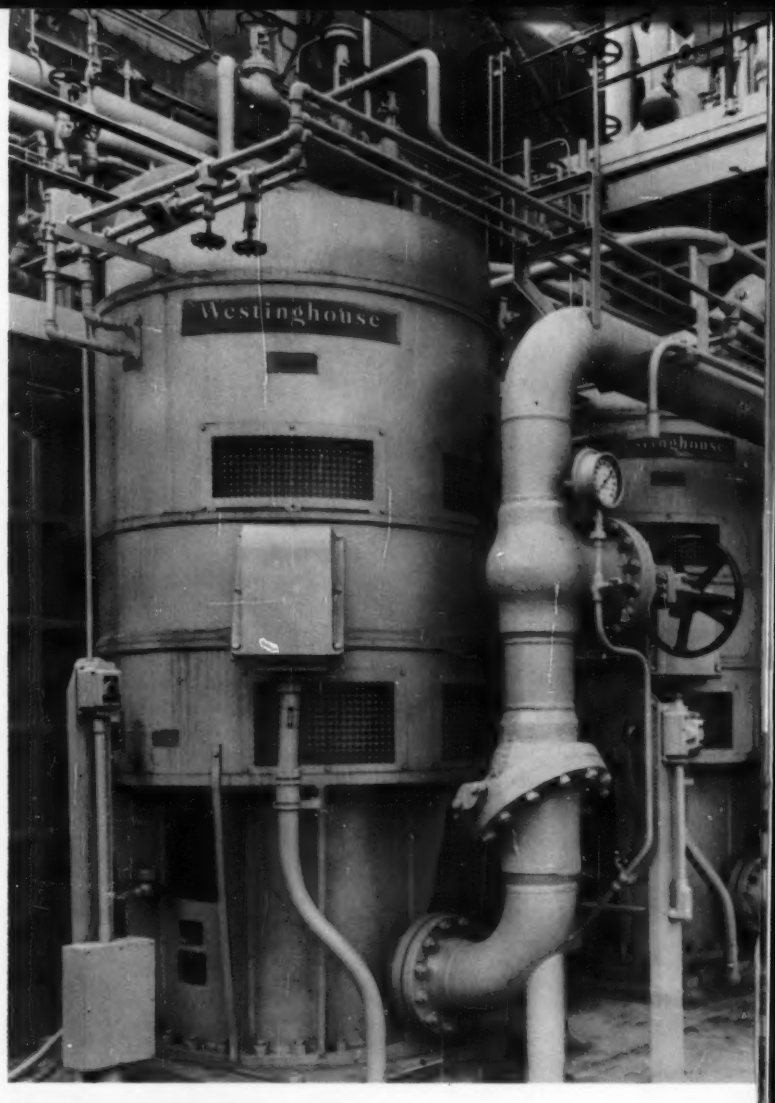
All DH air circuit breakers at Lauderdale employ the famous Westinghouse principle of De-ion® arc extinction . . . the fastest, safest, most dependable method ever devised.

The complete switchgear apparatus for this station was factory-assembled, wired and tested, each unit a standardized design throughout. This concept of design has proved installation, operation and maintenance less costly—a measurable asset year after year.

Project schedule is being discussed by J. W. Keck, Superintendent of Power Plants, Florida Power & Light; H. V. Street, Chief Engineer, Florida Power & Light; J. R. Bensen, Superintendent, Lauderdale Plant; R. P. Radford of Westinghouse.

In the transmission yard, H. V. Johnson, Substation Supervisor for F. P. & L., and G. F. Gilliland, Westinghouse Sales Engineer, discuss the industry's first use of 69-kv power breakers with 5000-mva interrupting capability.

WESTINGHOUSE POWERHOUSE MOTORS FEATURE EXCLUSIVE THERMALASTIC INSULATION



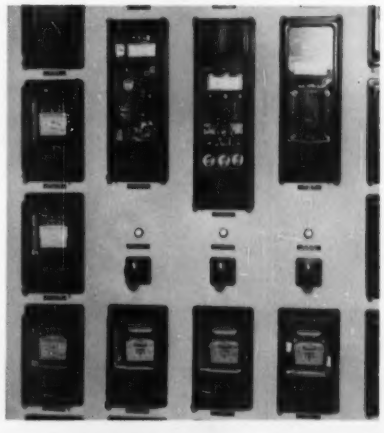
Boiler feed pumps are powered here by six 2000-hp squirrel-cage induction motors. As with other equipment at the station, they are all-weather protected against moisture and dust. Thermalastic insulation, known as the "insulation with a memory," forms a perfect dielectric barrier, prolongs coil life. Thermalastic insulation is, today, not only protecting F. P. & L.'s motor investment, but is providing trouble-free service life to over 40 million kva of large rotating apparatus throughout industry.

Other motors at Lauderdale include 450-hp circulating water pump motors and 300-hp condensate pump motors. CP-1050

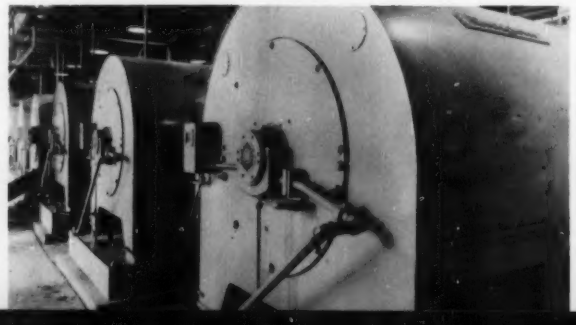
YOU CAN BE SURE...IF IT'S

Westinghouse

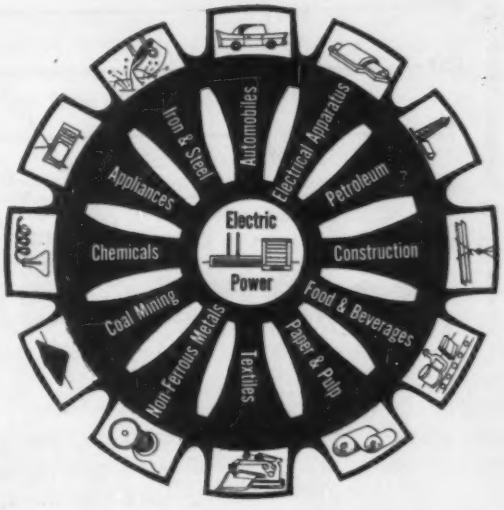
WATCH "WESTINGHOUSE LUCILLE BALL-DESI ARNAZ SHOWS"—CBS TV MONDAYS



Westinghouse relays and instruments round out the picture of efficiency, accuracy and protection offered by Westinghouse equipment at Lauderdale. These relays provide complete protection for the motors, generators and other electrical apparatus.



Westinghouse 400- and 800-hp, induced- and forced-draft fan motors for Lauderdale's boilers.



The '59 outlook for electric utilities hinges on the prospects for the new year of many segments of the American economy. Here, in capsule form is the . . .

Report on
Electrical
Business Outlook

'59 Outlook for 12 Key Industries

A prosperous new year is in the offing—for industry in general and for the electric utilities in particular. Most of the economy seems to be back on the high road as 1959 opens. To get as clear a view as possible of American industry in '59, McGraw-Hill's Dept of Economics surveyed the business community industry by industry. Here, in capsule form, are the new year's prospects for a dozen key industries whose performance in 1959 will go a long way toward determining the size of the utilities' kwhr load:

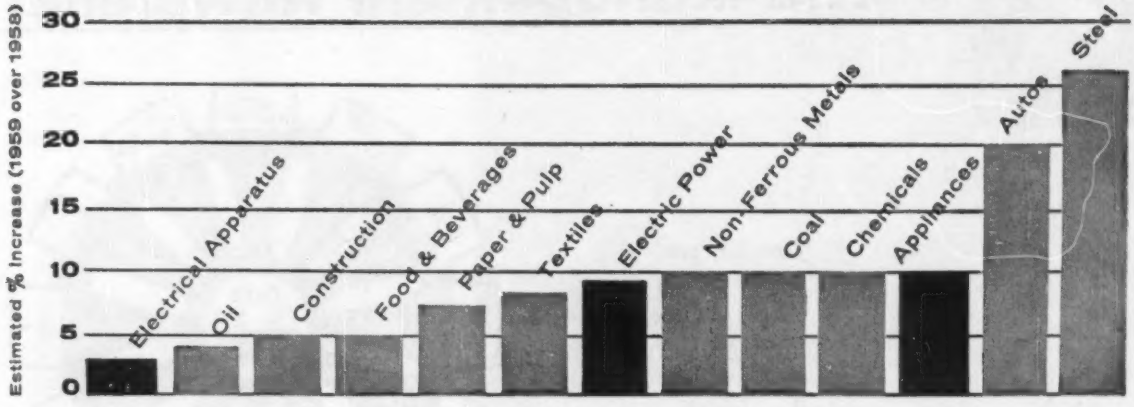
The oil industry looks for a 4.3% pick-up in demand next year, following a 1% gain in 1958. Leaders will be jet fuel and asphalt. Distillates also should do better than the average. The industry plans to spend 6% more for capital improvements in '59—primarily for exploration, drilling, and production.

Auto industry experts are estimating at least a 20% increase in sales and production of U. S. passenger cars in 1959—from 1958's abysmal 4.5 million units up to something over 5.5 million. Truck sales, 750,000 this year, should rise to about 900,000 in '59. Independent parts manufacturers look for a good year, particularly in truck replacement parts. Capital spending for the entire auto, truck, and parts industry should rise 4% above this year's low level, with most of it going for modernization.

Manufacturers of heavy electrical equipment anticipate a 3% gain in 1959 shipments of transmission, distribution, and generating equipment. This modest increase stems from utilities' plans to spend less next year on new facilities, but to put a higher proportion of their capital dollar into modernized equipment. Manufacturers' operating rate should hold around this year's 80% figure. Present plans call for a slight cut in capital spending in '59, a 15% increase in 1960.

New construction is due for a 5% rise in 1959 to a $51-billion total, with another $19 billion to go for maintenance and repair work. Private construction should

The 1959 Output Trend in 13 major industries



rise about 2%; public, about 11%. Slowest sector is industrial building, slated for a 20% dip in '59; but there's a big backlog of projects awaiting management's go ahead, so activity here could speed up fast.

Coal mining companies look for roughly a 10% increase in tonnage next year. Bituminous production should run around 450 million tons, compared with 405 million tons this year. Anthracite is in for a smaller increase. Capital expenditures, down 28% this year, are now scheduled for another 14% cut in '59; but plans may be revised upward as business improves.

The textile industry is looking for an 8% rise in demand next year, with both apparel and house furnishings due for gains between 5% and 10%. Capital spending is slated for a 13% cut, after a 35% reduction in '58; but an upward revision is expected. Modernization accounts for 80% of capital expenditures.

Food and beverage manufacturers anticipate a 5% gain in unit sales in '59, with food sales up 4% and beverage sales up 8%. The beer industry forecasts the biggest gains. Other leaders: confectionery, cereals and flour, general foods, and liquor distilling. Capital outlays are due to increase by 10%, with the lion's share going for modernization.

Steel producers predict a 26% gain in shipments for 1959, with an average operating rate of about 75%. Almost every industry, except possibly construction, will be increasing its consumption of steel and building up inventories as well. Expected output of 107 million tons ingot would make next year the fourth best on record. This year's output (85 million ingot tons) was the worst since 1949. Scheduled capital investment is off 13% following the record expansion which ended early in 1958.

Non-ferrous metals consumption should rise 10% in 1959—a smaller rise than steel, after a smaller drop in '58. Refined aluminum is expected to gain 15%; copper, 8%; and lead and zinc, 10%. This year was one of the worst since Korea, with the over-all industry operating rate running well under 70%. In 1959 it should average close to 78%. Non-ferrous metals companies plan the biggest cut in '59 capital spending—down 22% after a 48% cut this year. This largely represents the end of an expansion cycle in basic aluminum capacity.

Paper and pulp producers are looking forward to a 7% rise in sales next year. This industry led the economy out of the recession, closing 1958 with a 1% gain over 1957. Operating rate moved up from a low of under 85% in March to its

present 90%. It should come close to 95% in '59. Capital spending is in for a 6% drop next year, but plans for 1960 are already almost 12% higher.

Appliance manufacturers see a 10% sales gain ahead in 1959. The industry has been moving out of the doldrums since the middle of '58, and with family income and housing starts on the upside, the trend is expected to continue well into next year. Present plans call for substantial increases in capital spending by appliance manufacturers in both 1959 (15%) and 1960 (18%).

Chemical industry sales are expected to be 10% higher in 1959—for another record. Leaders will be plastics, pharmaceuticals, synthetic fibers, and many heavy chemicals. This year's operating rate averaged slightly under 80%. Next year's should be close to 85%. Capital spending will probably dip, but research expenditures are still increasing.

What does all this mean to the electric utility industry? It means that 1959 electric power sales ought to increase 9.5% over 1958 to 622 billion kwhr. The pick-up in housing and the upswing in appliances should boost residential sales 9.4% to 176 billion kwhr. Commercial sales should jump 8.5% to 110 billion kwhr. But the biggest improvement will come in industrial sales. With the wheels turning faster in these 12 industries and in the rest of the economy as well, industrial sales will rise by 10% to almost 301 billion kwhr.

Arkansas P & L Appeals; Two Utilities Seek Rate Changes

Rates and Regulation

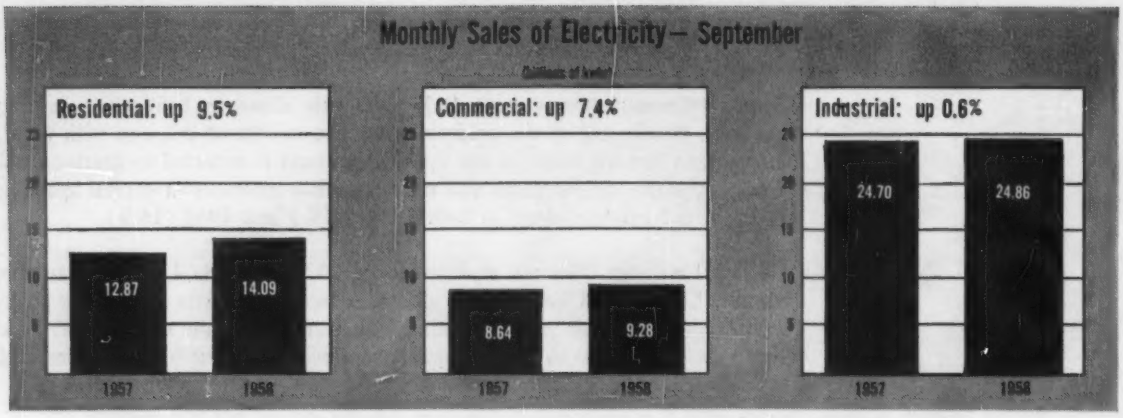
Arkansas Power & Light Co has charged "state interference" in appealing to the U. S. circuit court a Public Service Commission order that would permit a cooperative to serve part of a Little Rock Air Force Base housing project. The issue originated with a complaint by First Electric Cooperative Corp of Jacksonville. About half of the military housing area lies in its assigned territory, and the co-op contended that it should serve that portion. The PSC concurred.

Arkansas P&L's appeal came after the PSC denied its petition for a rehearing. It charges "interference by the state in a federal function," in that the PSC's action amounts to a modification of the company's contract with the Air Force. The company did virtually all the groundwork in Little Rock and Washington, to convince the Air Force that the housing at the base should be "all-electric."

To get a $1.6-million gain in net income, Columbus & Southern Ohio Electric Co had to apply for a $3.4 million annual rate increase on residential and other secondary service in Columbus and other unincorporated areas of Franklin County. Federal income and state excise taxes will take 53¢ of every $1 of the proposed hike, the company said, while rising costs of labor, equipment, and coal have contributed to the "continuing rate of decline in earnings."

The proposed C&S residential schedule would up the minimum bill from $1 to $1.50 and lower the last step from 2¢ to 1.9¢ for everything over 200 kwhr. In a letter to Columbus officials, C&S Pres Harry M. Miller explained that to achieve uniformity of rates in the city and outside areas and to avoid delay, the company had applied to the Public Utilities Commission. A provision in the city's charter calls for approval of voters in a referendum.

West Penn Power Co has filed two new rates and established a 120/240-v service standard with the state commission. An all-electric residential rate of 1.65¢ per kwhr is sought for use exceeding 500 kwhr per month. Previous bottom step was 2¢. The other new rate application would provide for installation of private street lights under specified conditions.



Power Statistics

		Latest Month	Year Ago	Annual Change %
Capacity	Sept.	136.99	126.24	8.5
Peak—Class I Systems, million kw	Dec.	107.1	102.4	4.6
Estimated Dec. '58 Peak	Sept.	117.1	122.7	– 4.6
Production—billion kwhr	Sept.	53.99	51.57	4.7
Hydro		10.74	9.28	15.7
Fuel		43.25	42.29	2.3
Sales—billion kwhr	Sept.	51.08	49.01	4.2
Residential		14.09	12.87	9.5
Commercial		9.28	8.64	7.4
Industrial		24.86	24.70	0.6
Other		2.85	2.81	1.4
Fuel Consumption	Sept.			
Coal—million tons		12.34	12.75	– 3.2
Oil—million barrels		6.43	5.64	14.0
Gas—billion cu ft		141.68	137.60	3.0
Net Income Class A & B Co's—$ million	Sept.	128.36	116.20	10.5
Residential Customers—millions	12 mos.	47.49	46.61	1.9
Revenue per kwhr	ended	2.53¢	2.57¢	– 1.6
Avg kwhr per customer	Sept. 30	3,331	3,121	6.7
Avg annual bill		$84.27	$80.21	5.1

Business Statistics

Indexes: 1947–49 = 100				
FRB Industrial Production	Nov.	144	140	2.9
ENR Construction Cost	Dec.	162.2	154.7	4.8
BLS Cost-of-living	Oct.	123.7	121.1	2.1
New Orders for Machinery (1950 = 100)	Oct.	145	120	20.8
NEMA Sales				
Insulation materials	Oct.	135	133	1.5
Electric appliances		109	88	23.9
Wholesale prices				
Motors and generators	Sept.	146.8	143.3	2.4
Transformers and regulators		148.8	150.8	– 1.3
Switchgear and fuses		172.1	170.6	0.9
GNP—annual rate—$ billion	3rd qtr	440.0	445.6	– 1.3

Significant changes: Industrial kwhr sales topped year-ago levels in September, after ten consecutive months of lagging. Commercial and residential sales also chalked up further gains.

here's the inside story on Southern States cutouts and boric acid fuse links

While Southern States Distribution Cutouts are designed to function properly with other makes of fuse links, there is a measurable difference in performance when Southern States boric acid links are used—not only in our cutouts, but in other makes, too.

The cutaway view tells the inside story of why Southern States Cutouts and Fuse Links work together to provide the ultimate in fuse protection.

The auxiliary tube of the link is unusually long and sealed to the top ferrule. The fusible element is buried in boric acid powder.

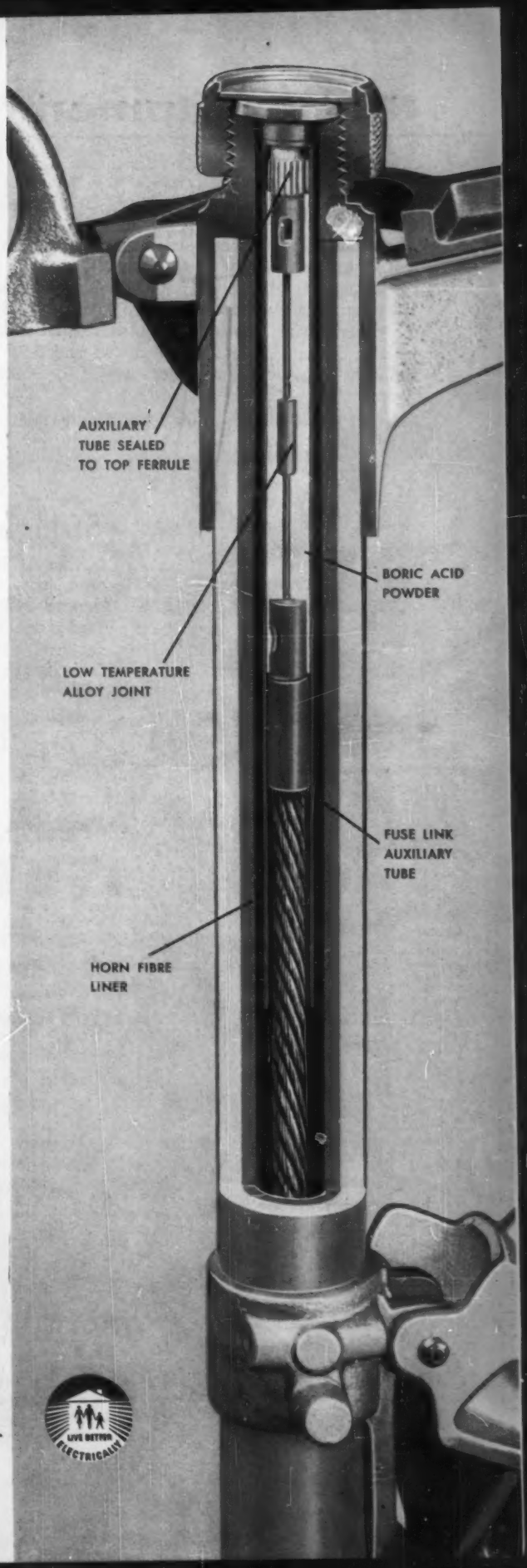
When a fault occurs, even one just sufficient to melt the fusible element, a lot of things happen fast: First, an arc is established when the element separates. The heat generated by the arc instantly converts the boric acid powder into water and then into a large volume of steam. This action performs a dual task. First, vaporization of the water and rapid expansion of gas cools the arc. Simultaneously the arc stream is purged of ionized gas by a fast-moving column of steam.

Circuit interruption is swift and sure.

At higher values of fault current, pressures generated destroy the auxiliary tube. When this happens the same action that occurred in the auxiliary tube takes place in the main fuse tube.

For the ultimate in fuse protection on low or high faults, use Southern States Cutouts and Fuse Links.

Get full information from your Southern States representative, or write for Bulletins 58OC and 55PDL.


AUXILIARY TUBE SEALED TO TOP FERRULE
BORIC ACID POWDER
LOW TEMPERATURE ALLOY JOINT
FUSE LINK AUXILIARY TUBE
HORN FIBRE LINER

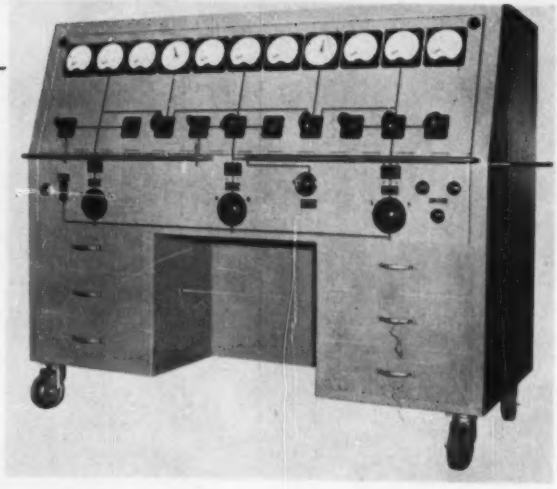
SOUTHERN STATES
EQUIPMENT CORP.
HAMPTON, GEORGIA

IN CANADA Dominion Cutout Co., Ltd., Toronto

LIVE BETTER ELECTRICALLY

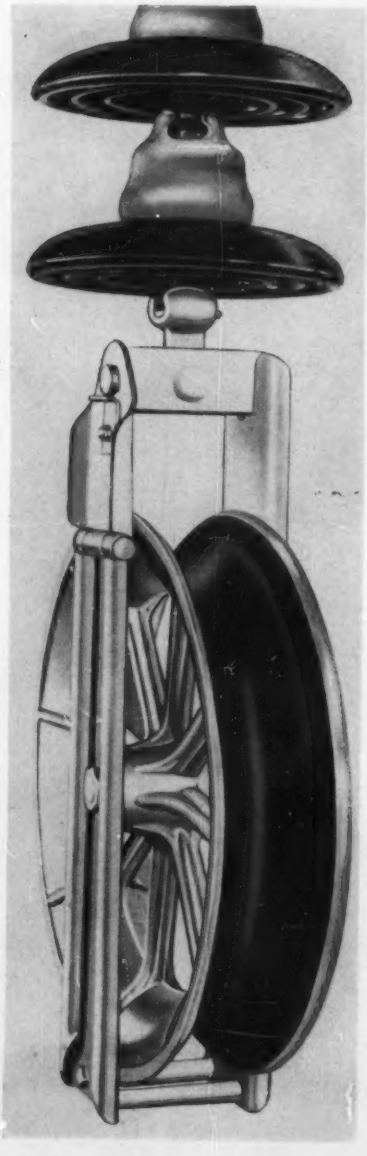
New Equipment

Switchboard Tester . . .



. . . functionally tests a complete metering and relay system. It has two 3-phase voltage outputs, one with fixed phase angle and the other with variable phase angle. Voltages are all variable from zero to 150 and 300 v for either 3-wire or 4-wire outputs. The tester has a variable 3-phase current output of 0-5 and 0-25 amp and can be switched to either two-CT or three-CT systems.

Nelson Electric Mfg Co, Box 5385, Tulsa, Okla.



Stringing Block . . .

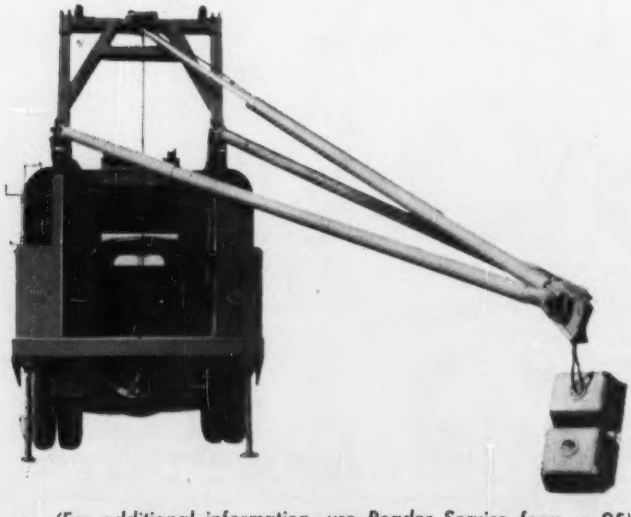
. . . for ACSR and aerial cables has frame made of steel stampings. Sheaves are aluminum alloy, with bonded neoprene liners available as optional equipment. Attached socket eye fits standard insulators. It is manufactured in three basic models, with sheaves from 5 to 28 in. in regular and wide throat styles. Detachable pole brackets and crossarm bases may be obtained.

Campbell Specialty Co, Box 789, Okmulgee, Okla.

Hydraulic Derrick . . .

. . . features side movement to reduce truck maneuvering. Side, fore and aft, and up and down movement of the Model DHDS derrick makes it possible to completely plumb any pole without use of a pike. It can reach 9 ft to either side from center line of truck chassis. The derrick can lift from 2,500 lb with sheave at ground level to 12,500 lb at maximum elevation.

Utility Body Co, 1530 Wood St, Oakland 7, Cal.

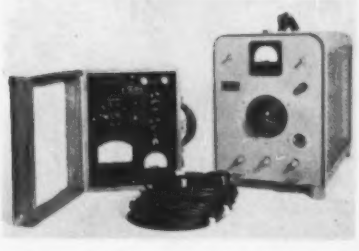


(For additional information, use Reader Service form, p 95)

Radiation Monitor . . .

. . . **sounds alarm** when uranium or plutonium are assembled so as to approach criticality.The instrument, known as the Criticality Monitor 32, meets regulations of the Atomic Energy Commission for installation in plants where possession of more than 500 gm of contained U_{235}, 300 gm of plutonium, or 300 gm of U_{233} was authorized. The unit is about 1 cu ft in size and weighs 30 lb.

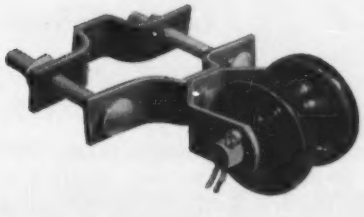
Nuclear Corp of America, 2 Richwood Place, Denville, N. J.



Contact Test Set . . .

. . . **checks condition of oil and air circuit breaker contacts** and paths from bushing terminals without disassembling. It can also detect abnormally high resistance in cable joints, bus connections and other equipment where the normal resistance is in the microhm range. The Model 151-S Microhm meter measures resistance values as low as 1 microhm with 2% accuracy. Self-contained battery permits use in locations where normal supply is not available.

J. W. Dice Co, Englewood, N. J.



Insulator Bracket . . .

. . . **fits 1¼-in. to 2½-in. service entrance masts.** The spool-type insulator of the No. 4900 Insulator

(*Continued on page* 94)

To prevent pole and power line leaning...

guy with

CF&I GALVANIZED STEEL STRAND

Whether it is an installation involving exposure to the corrosive action of acrid industrial fumes or to severe storms—public utility linemen know that CF&I Galvanized Steel Strand will withstand rugged service.

Meticulous adherence to standards characterizes every step in the manufacture of CF&I Galvanized Steel Strand. It meets or exceeds ASTM Specifications A-122 or A-363—or, if you prefer, our Buffalo, N. Y. or Pueblo, Colo. plants will make it to your specifications in seven- or three-wire constructions. When you're in the market for top quality, guy, messenger or overhead ground wire, contact your nearby CF&I representative or your local electrical distributor.

5690

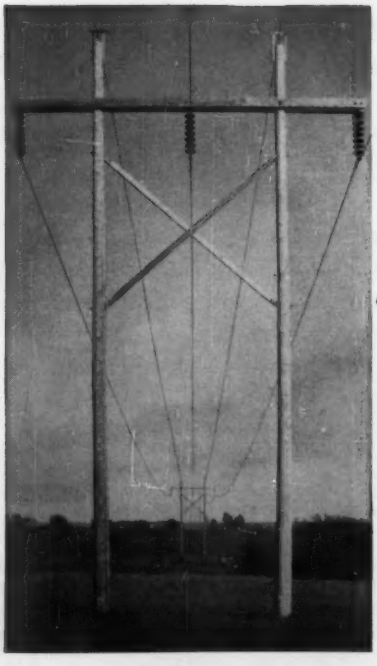
GALVANIZED STEEL STRAND
THE COLORADO FUEL AND IRON CORPORATION

Albuquerque • Amarillo • Atlanta • Billings • Boise • Boston • Buffalo • Butte • Chicago • Denver
Detroit • El Paso • Ft. Worth • Houston • Kansas City • Lincoln (Neb.) • Los Angeles • New Orleans
New York • Oakland • Oklahoma City • Philadelphia • Phoenix • Portland • Pueblo • Salt Lake City
San Francisco • Seattle • Spokane • Wichita. CF&I OFFICES IN CANADA: Montreal • Toronto

Now...PAGE & HILL maintains 3

MECHANIZED YARDS

and treating plants



. . . with modern handling equipment to supply you promptly and efficiently with *completely* decay-immune power-line poles—

LIFE-SPAN WESTERN RED CEDAR POLES

or Treatments to comply with all approved E.E.I. or A.W.P.A. non-pressure specifications.

PAGE & HILL, Inc.
Minneapolis 3, Minnesota

Life Span

Insulator Bracket . . .

(*Continued from page* 93)

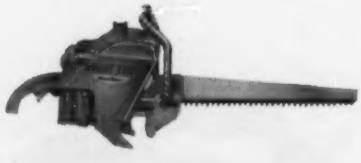
Bracket utilizes wet process porcelain to withstand heavier abuse than dry process. Mounting for the spool is a ½-in. removable pin, permitting easy insulator replacement without discarding the complete fitting. In addition, the pin-mounted insulator reduces vibration transfer to the mast and improves dependability.

M & W Electric Mfg Co, Inc, East Palestine, Ohio

Luminaire . . .

. . . has one-piece prismatic refractor made of thermal shock-resisting glass for a light controlling element. Known as No. 440, the luminaire is designed for use with 400-w mercury vapor or 500-w incandescent lamps. A stainless steel spring hinge supports glass member. It can be installed on cast aluminum bracket No. 0877 or standard pole bracket arm.

Holophane Co, Inc, 342 Madison Ave, New York 17, N. Y.



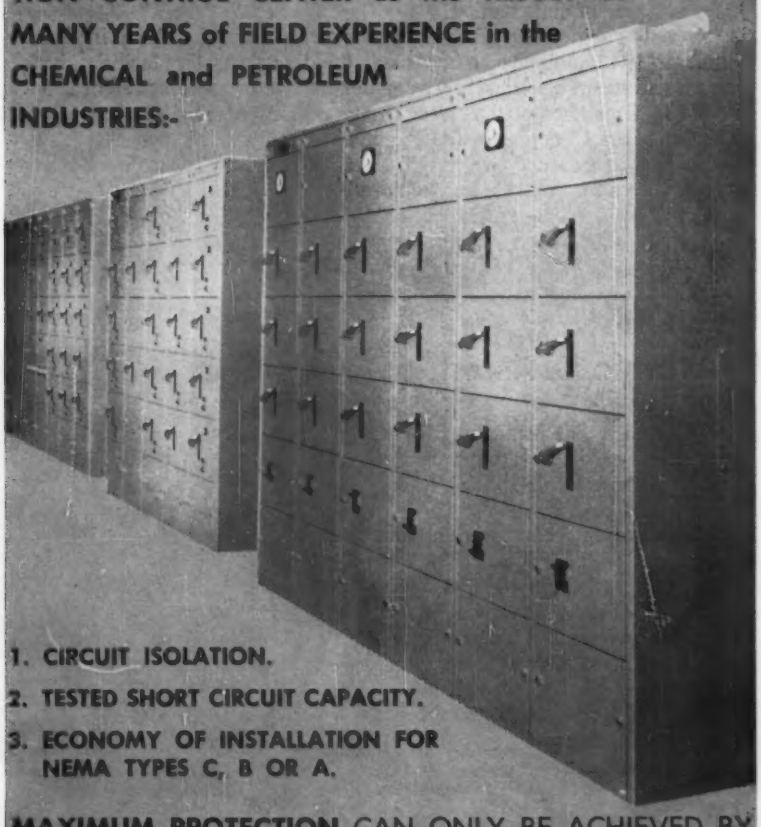
Power Saw . . .

. . . has reciprocating blade with 20-in. cutting surface. Safety features include throttle which shuts off engine automatically if saw is accidentally dropped. Weighing less than 25 lb, it can be used in any position. The molybdenum disulfide coated blade needs no oiling.

Wright Power Saw & Tool Co, 410 S Third St, Louisville 2, Ky.

HERE *is the* ENGINEER'S CONTROL CENTER

WITH POSITIVE FEATURES THAT WERE DEVELOPED and DESIGNED INTO THIS ALL-NEW MAXIMUM PROTECTION CONTROL CENTER as the RESULT of MANY YEARS of FIELD EXPERIENCE in the CHEMICAL and PETROLEUM INDUSTRIES:-



1. **CIRCUIT ISOLATION.**
2. **TESTED SHORT CIRCUIT CAPACITY.**
3. **ECONOMY OF INSTALLATION FOR NEMA TYPES C, B OR A.**

MAXIMUM PROTECTION CAN ONLY BE ACHIEVED BY COMPLETE **CIRCUIT ISOLATION** PLUS TESTED SHORT CIRCUIT CAPACITY.

SEND TODAY for your copy of the new TECHNICAL DESIGN DATA BOOK of maximum protection control centers.

NORTHEASTERN ENGINEERING, INC.

MANCHESTER, N. H. • 25 So. Bedford St.

P. O. Box 150 • NAtional 2-6485

Reader Service

For additional information on new products, supplies, and services in this issue, the Manufacturers Editor of Electrical World offers his facilities. Check items in which you are interested in list below:

NEW EQUIPMENT

Nelson .....Tester ☐
Campbell .....Stringing Block ☐
Utility Body .....Derrick ☐
Nuclear Corp. .....Monitor ☐
J. W. Dice .....Test Set ☐
Holophane .....Luminaire ☐
Wright .....Power Saw ☐

OTHER

_____

Manufacturers Editor
Electrical World
330 W. 42nd St.
New York 36, N.Y.

* **Note: Requests must be received within four weeks of publication date, accompanied by complete information specified. This service cannot be offered to readers in foreign countries or to competitive manufacturers.**

NAME _____
TITLE _____
DEPT. _____
COMPANY _____
ADDRESS _____

_____

FOR:
Reference ..... ☐
Specs ..... ☐
Trial ..... ☐
Purchase ..... ☐

December 29, 1958

Duke Power Names Wanzer Chief Engineer

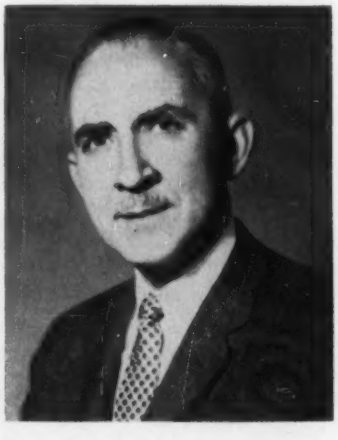
Charles T. Wanzer has been named chief engineer of the Duke Power Co. He succeeds David Nabow who died November 30.

A widely-known authority in the power plant construction field, he has managed Duke Power's plant extension program as vice president and manager of construction.

A civil engineering graduate of Cornell University, he joined the utility in 1948 and played a key role in building generating facilities, both hydro and steam-electric. He was made manager of construction in 1954.

He is a member of the American Society of Mechanical Engineers, the American Concrete Institute and the Charlotte Engineers Club. In 1956 he was awarded the annual award of the North Carolina Society of Engineers for "outstanding achievement."

Currie to Head B&W Atomic Division

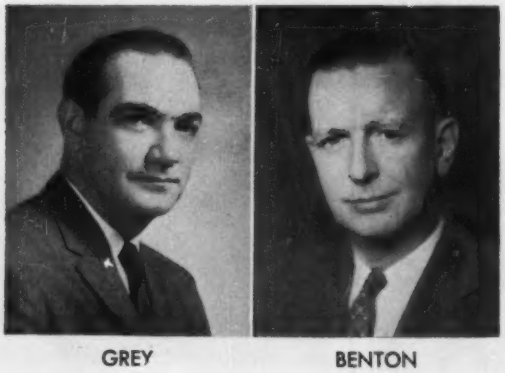


Dr. Lauchlin M. Currie has been elected a vice president of The Babcock & Wilcox Co and placed in charge of the atomic energy division. He was formerly vice president of the Union Carbide Nuclear Co, a division of Union Carbide Corp.

He joined Union Carbide in 1925 as a research chemist for National Carbon Co, later becoming superintendent of the Edgewater Works in Cleveland. He has also served as director of the Vinylite division in Cleveland, superintendent of the plant of Bakelite Company at Bound Brook, and acting director of research for National Carbon laboratories. In 1945 he was made vice president in charge of research, and became vice president of Union Carbide Nuclear Co in 1955.

Dr. Currie has served as U. S. representative at the conference of the organization for European Economic Cooperation.

Grey, Benton Appointed to New Posts at Anaconda

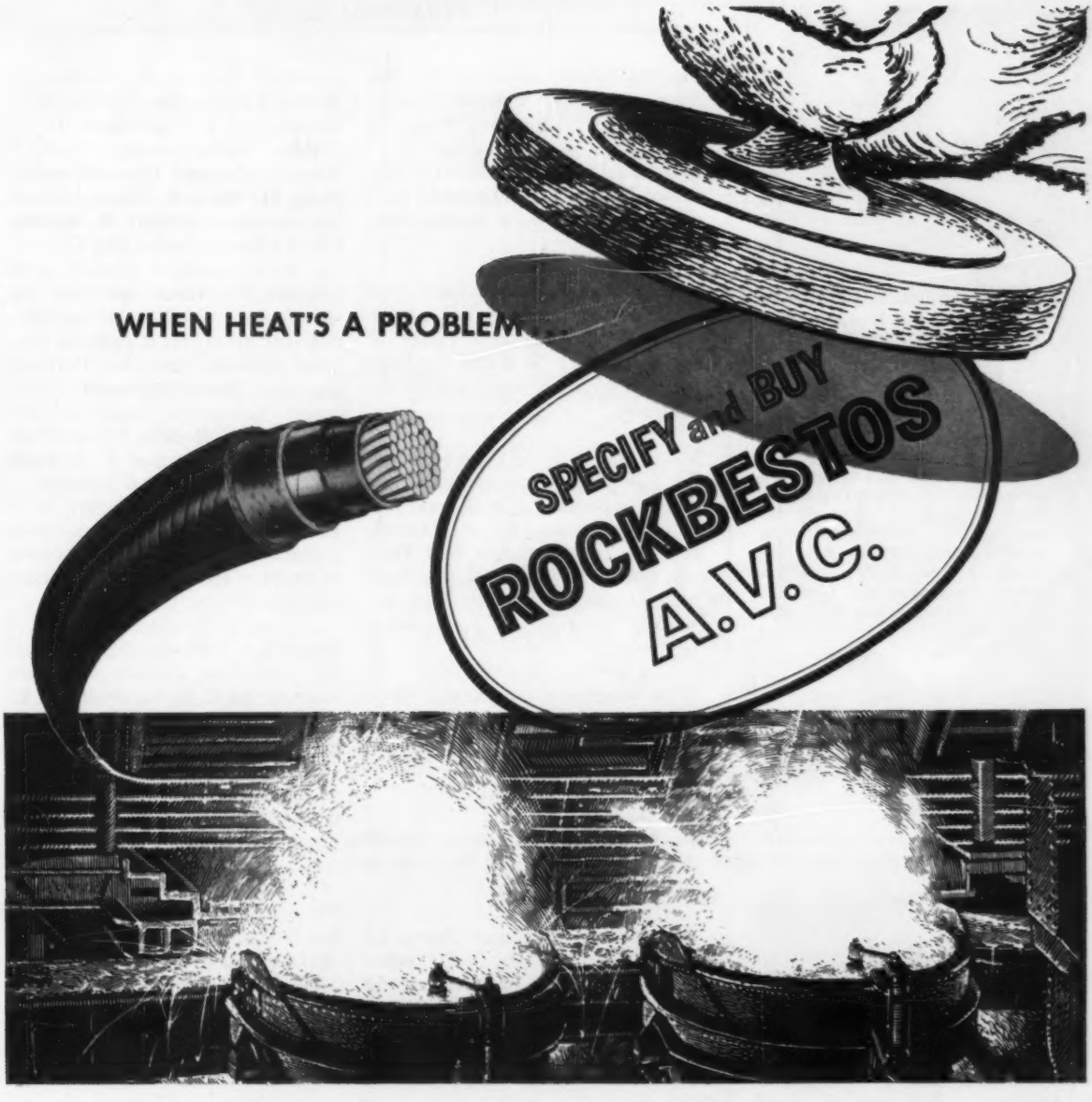


GREY BENTON

William L. Grey has been appointed to the newly created post of vice president and general counsel, and William H. Benton, Jr. has been named general manager of mills, at the Anaconda Wire & Cable Co.

Grey has been assistant vice president-manufacturing since 1957. He started with the company in 1939 in the time study department. A mechanical engineering graduate of New York University, he attended Brooklyn Law School and the Harvard School of Business Administration.

Benton began with Anaconda as an hourly employee and then became sub-foreman, night superintendent and mill superintendent. He was mill manager of the company's Marion, Ind., mill from 1951 to 1957, when he became assistant vice president-manufacturing.



Steel Mill and Foundry "hot spots" provide one of industry's worst torture chambers for wire and cable. Heat, overloads and corrosive fumes combine to kill ordinary cable quickly.

Don't take a chance on ordinary cable for troublesome "hot spot" applications. *Specify and use Rockbestos A.V.C.*

This superior AVA cable, with asbestos, varnished cambric insulation, takes temperatures up to 230°F, assuring continuous operation in hot spot applications, provides greater current carrying capacity for increased and new loads.

When you *specify and buy Rockbestos A.V.C.*, you reduce your electrical maintenance and construction costs . . . you get years more dependable service.

Write now for the new Rockbestos RSS-88 to help you *specify and buy Rockbestos A.V.C.*

ROCKBESTOS PRODUCTS CORPORATION
NEW HAVEN 4, CONNECTICUT

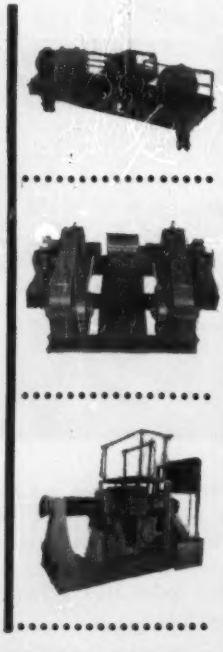
NEW YORK • CLEVELAND • DETROIT • CHICAGO • PITTSBURGH • ST. LOUIS
ATLANTA • DALLAS • SEATTLE • LOS ANGELES • BURLINGAME, CALIFORNIA

ROCKBESTOS A.V.C.

THE SUPERIOR A.V.A. CABLE

....to CONTROL WATER LEVEL at LONG SAULT DAM, ST. LAWRENCE PROJECT

Each hoist weighs 93,000 lbs., shipped completely equipped with all electric motors, controls, limit switches, wired ready for operation . . . the overall length of one unit is 57 feet, 8½ feet wide, 12½ feet high . . . with a lifting capacity of 175 tons . . . will raise and lower the gates in the dam at a speed of 1 foot per minute.



This is one type of Gate Hoist designed and manufactured by us, backed by 75 years' experience. MURCO Gate Hoists are designed in a wide range of capacities from this large Gate Hoist to less than one ton.

Write for complete information on MURCO Gate Hoists and engineering recommendations to meet your specific power dam requirements.

D. J. MURRAY MANUFACTURING CO.

WAUSAU WISCONSIN

PERSONAL BRIEFS

Virginia Electric and Power Co has made **John M. McGurn** District Manager of its Norfolk District.

Potomac Light & Power Co has named **Patrick L. McLaughlin** residential electric space heating specialist.

Bruce M. Menees has been promoted to manager of the Little Rock properties for Arkansas Power & Light Co. **Jack N. Karas** has been named training administrator for the company.

Saskatchewan Power Corp has made the following appointments: **C. E. Smith,** to director of public and employee relations; **M. G. Leach,** buildings superintendent; **E. J. Durnin,** director of planning and administrative controls; **J. C. Blewett,** executive assistant to the general manager.

RCA Whirlpool has named three men to the post of sales supervisor in the air conditioning division. They are, **David H. Armbruster, Warren M. Singer** and **Mark Stites.**

Dr. George Town has been named dean of the Division of Engineering at Iowa State College.

Riley Stoker has named **George C. Vail** district manager, and **Charles E. Meyer,** sales engineer in the Philadelphia office.

The Electrical Association of Philadelphia has elected **R. G. Rincliffe** president. Rincliffe is president of the Philadelphia Electric Co. Other officers are: vice president, **L. B. Perkins,** district manager, General Electric Supply Co.; treasurer, **Philip H. Ward, Jr.,** Ward Electric Co; secretary, **William E. Rubert,** Union Electric Contracting Co.

Clarence J. Frenck has been assigned to work with the United Nations in Ceylon. He is a retired electrical engineer from the Portland District, Corps of Engineers.

The British Columbia Power Commission has appointed **P. J. Croft** assistant to the general manager.

Thomas W. Benham has been elected vice president and director of Opinion Research Corp, Princeton, New Jersey.

Singmaster & Breyer Metallurgical and Chemical Process Engineers have elected **C. E. Kaddy, Jacob C. Muskin,** and **E. Roy Sweet** as partners.

Hubbard & Co has appointed **Arthur C. Westrom** director of engineering, research, and development.

Hotpoint Co has named **R. C. Hawley** general manager of its newly-created distribution department.

Allis-Chalmers Manufacturing Co has appointed **John W. Baum** supervisor of health physics in Safety Services.

Sales Assignments

COMPANY STAFFS

RCA Whirlpool Corp has made Howard F. Fairman district sales manager of appliances in its Charlotte-Chattanooga-Knoxville-Nashville-Birmingham district.

Day-Brite Lighting, Inc., has appointed Charles L. Hitchcock sales representative in Chicago, and George J. Kennedy general sales manager for its eastern division.

Line Material Industries, McGraw-Edison Co, has appointed Thomas R. Forbus lighting engineer for its Eastern Division.

Anaconda Wire & Cable Co has opened a new Birmingham, Alabama district office with Bryn W. Waters as district manager, Stewart M. Graham as salesman.

Mathias Klein & Sons, Chicago, has appointed three new sales engineers:

Richard Colsant, Atlanta, covering the Southeast; and Stafford Gavin, Pittsburgh, covering East North Central states, and Ervin Suess, Kansas City, covering the Middle West.

Allis-Chalmers Industries Group has appointed Leo E. Engleson manager of the Rochester district.

Atlas Mineral Products Co has appointed Erik Van Anglen district sales manager for the New York sales territory.

Pfaff & Kendall, Newark, New Jersey, has named Forrest E. Pope, Burlingame, Calif, Western Sales Manager.

H. K. Porter Company, Inc, Riverside-Alloy Metal Division, has appointed Walter R. Keith to the sales staff.

T. B. Dally, Manufacturer's Sales Representative, Jersey City, N. J. has added William M. Collier to his sales organization. Mr. Collier was formerly outside construction manager for Graybar Electric Co, Eastern District, New York.

Keasbey & Mattison Co has named John L. Prechek assistant manager of the San Francisco district.

BullDog Electric Products Co has made Paul E. Morgan midwest regional manager. He was formerly Cleveland district manager.

Ilg Electric Ventilating Co, Chicago, has appointed Philip S. Heisner to its sales office.

Whether a Winch Line Hook or a complete Line Body check your requirements with
UTILITY TOOL & BODY CO.
CLINTONVILLE, WISCONSIN
UT&BCo

DID MACY'S TELL GIMBELS
about those wonderful
MARCUS
transformers
We don't know . . . but both of these nationally famous department stores use Marcus Transformers for power and lighting distribution.
Marcus "Mark of Quality" transformers GUARANTEE trouble-free service and safe, dependable operation. For bigger profits and greater customer satisfaction, use MARCUS for your next installation.
MARCUS
TRANSFORMER CO., Inc.
RAHWAY, NEW JERSEY
Representatives in Principal Cities
MTC
"Mark of Quality"
A COMPLETE LINE OF DRY TYPE AND LIQUID-FILLED TRANSFORMERS THRU 5000 KVA

CAREER OPPORTUNITIES IN BUSINESSPAPER JOURNALISM

For Electrical and/or Mechanical Engineer

Two opportunities currently exist on the editorial staff of Electrical World.

Field Editor—To cover electric utilities and electrical manufacturers in the Southeastern States, soliciting and editing articles from their engineers, writing articles on new developments, reporting on industry meetings. An opportunity to grow with the electric power industry, in association with top professionals and the industry's leading business publication. Utility experience in operation and construction will command a salary fully commensurate with this background. Age 25 to 40, EE or ME degree.

Field Editor, Trainee—To work with New York and field staff in training for position such as described above. An opportunity for a recent EE grad or a senior to graduate June 1959. Liberal starting salary, plus the professional advantage of broad, working association with the industry.

Please address replies, in confidence, to Leonard M.Olmsted, Managing Technical Editor, ELECTRICAL WORLD—A McGraw-Hill Publication, 330 W. 42nd Street, New York 36, New York.

Power Briefs

• BPA offer would get 'careful attention,' says PG&E

• If Pacific Gas & Electric Co receives a Bonneville Power Administration offer to sell "non-firm interruptible" energy to California, "You may be sure it will be given the most careful attention," according to Walter Dreyer, PG&E vice president-chief engineer. PG&E has heard recurring rumors such an offer was being considered by BPA (EW Nov. 24, p 50), Dreyer added, but to date has received no communication concerning it, "so we can't comment." One deterrent to operation of a satisfactory transmission tie between the Northwest Power Pool and major adjacent systems—such as California or the Missouri Valley system of the Bureau of Reclamation—has been the relatively rough frequency control of the Northwest Pool. BPA spokesmen indicated plans to remove this difficulty, by placing in operation a centralized load-frequency control system for federal Columbia River power generation by June 1962.

• Pacific Gas & Electric Co has decided to go ahead with a 12.5-Mw geothermal steam generating plant in Sonoma County, Calif., if the state commission approves PG&E's application. The project will cost about $2 million, including transmission, and will be completed in the spring of 1960. Magma Power Co and Thermal Power Co will supply steam from geysers in the Big Sulphur Creek area for the proposed plant.

• The utilities director for Cleveland has asked the city council to pass legislation enabling him to enter into a direct contract on transformer purchases without competitive bidding. He explained that he could get four needed units cheaper by negotiations than on bids.

• Testing has been completed and power is now on the line from the first unit of the Memphis, Tenn., municipal plant. The 250-Mw unit is the first of three going into the $121.5-million steam plant, which The Nashville Tennessean described as "a tombstone beneath which lie the ill-fated, stillborn remains of the Dixon-Yates plan."

• The Santee-Cooper Authority of South Carolina has slated a $36-million, 120-Mw hydro plant to be located at Conway.

• An agreement has been signed by New Jersey Power & Light Co and Jersey City paving the way for the utility's proposed $14-million pumped-storage project. The facility will draw water from a $7.4-million dollar reservoir near Rockaway, N. J., which the city will build.

• Jersey Central Power & Light Co has received approval from the public service commission to buy Tri-County Rural Electric Co, Inc, for $917,000. The co-op serves 2,400 customers in four counties.

Pend Oreille County Public Utility District No. 1 is planning to build a 300,000-kw hydro dam across the Pend Oreille River in Pend Oreille County, Wash. Project, to be known as "Z Canyon," conflicts with a license application filed previously by the City of Seattle for the "Boundary Project." Pend Oreille has proposed two alternatives to expand the ultimate capacity of the Z project: The Z Canyon dam would be raised to add 212,000 kw; or two other dams (Slate Creek, 120,000 kw, and Deadman's Eddy, 72,000 kw) would be built on the Pend Oreille River to add a total of 192,000.

Public Service Co of Indiana put the first 150-Mw unit of its new plant at New Albany on the line last November. The station will cost $110 million when completed.

Four 250-Mw units will be installed in the steam plant under construction by Southern Electric Generating Co. The Alabama Public Service Commission recently approved sale of $90 million in capital stock of SEG to Alabama Power Co and a like amount to Georgia Power Co, joint owners of the generating firm.

-PROFESSIONAL SERVICES-

BLACK & VEATCH
Consulting Engineers
Electricity—Water—Sewage—Industry
Reports, Design, Supervision of Construction
Investigations, Valuations and Rates
1500 Meadow Lake Parkway
Kansas City 14, Missouri

THEODORE D. BROSS LINE CONSTRUCTION CORP.
Steel Tower & Wood
Transmission Lines
Distribution & Maintenance
175 Enfield St. Hartford, Conn.

COMMONWEALTH SERVICES INC.
Management and
Business Consultants
300 Park Ave
New York 22, N. Y.

ASSOCIATES INC.
Consulting and Design
Engineers
200 E. Washington
Jackson, Michigan

ELECTRICAL TESTING LABORATORIES, INC.
Electrical, Electronic, Environmental, Photometric and Chemical Laboratories. Testing, Research, Inspection and Certification.
2 East End Ave. New York 21, N. Y.

HOOSIER ENGINEERING COMPANY
Erection and Maintenance of Electrical Transmission and Distribution Lines
1350 Holly Ave., Columbus 16, Ohio

JENSEN, BOWEN & FARRELL
Engineers
Appraisals—Investigations—Depreciation Studies—Cost Trends—Reports
for Rate Cases, Security Issues, Regulatory and Accounting Requirements
Original Cost and Continuing Property Record Determination
Ann Arbor, Michigan

PIONEER SERVICE & ENGINEERING CO.
Consulting and Design Engineers . . Purchasing Specialists in Financing Accounting and other Operations
231 So. La Salle St. Chicago 4

SANBORN MAP COMPANY
Nation Wide Mapping Services
• Utility Area Base Maps
• Symbolized System Portrayal
Atlanta - New York - Chicago - San Francisco

SARGENT & LUNDY
Engineers
140 South Dearborn St.
Chicago, Ill.

TIPPETT & GEE
Consulting Engineers
Mechanical • Electrical • Thermodynamic
Structural Design • Studies • Supervision
Power Stations • Transmission • Distribution
Industrial Plants • Process
1333 North Second Street Abilene, Texas

CLASSIFIED SEARCHLIGHT SECTION ADVERTISING

EMPLOYMENT • BUSINESS • OPPORTUNITIES • EQUIPMENT—USED or RESALE

DISPLAYED RATE:
EMPLOYMENT OPPORTUNITIES: $22.67 per inch. Subject to Agency Commission.
EQUIPMENT & BUSINESS OPPORTUNITIES: $16.85 per inch for all advertising appearing on other than a contract basis. Not subject to Agency Commission.
AN ADVERTISING INCH is measured ⅞ inch vertically on one column, 3 columns—30 inches—to a page.
EQUIPMENT WANTED or FOR SALE ADVERTISEMENTS acceptable only in Displayed Style.

UNDISPLAYED RATE:
$1.80 a line, minimum 3 lines. To figure advance payment count 5 average words as a line.
PROPOSALS, $1.80 a line an insertion.
BOX NUMBERS count as one line additional in undisplayed ads.
DISCOUNT OF 10% if full payment is made in advance for four consecutive insertions of undisplayed ads (not including proposals).

SEND NEW ADVERTISEMENTS TO Classified Advertising Div. of ELECTRICAL WORLD, P. O. Box 12, N. Y. 36, N. Y.

TRANSFORMERS

3—500 KVA G-E 22000-2300/4000Y
3—500 KVA W-H 13200-2300/4000Y
3—500 KVA G-E 7200-2400/4160Y
3—400 KVA W-H 11500-2400/4800
3—333 KVA G-E 2400-240x480
3—333 KVA W-H 2400-120x240
6—167 KVA G-E 7200-2400/4160Y
1—750/938 KVA G-E 3-Ph. 33000-6900Y TCUL equip. fan cooling
1—1000 KVA W-H 3-Ph. 33000-7200Y TCUL equip.
1—1500 KVA W-H 3-Ph. 13200-480
1—2000 KVA W-H 3-Ph. 13800-2400

Many Other Items in Stock

TRANSFORMERS WANTED
Reliable rewind and repair service on all makes of transformers

THE ELECTRIC SERVICE CO.
5331 Hetzel St.
Cincinnati 27, Ohio
45 Years' Dependable Service

SUBSTATION EQUIPMENT

TRANSFORMERS

QU.	KVA	MFGR	VOLTAGE
4	1667	Mol.	69,000–34,500
3	1500	G.E.	66,000–2400/4160
3	833	West.	66,000–6,900/11950
3	500	Wagner	69,000–460
3	300	West.	69,000–6900
1	2500	Mol.	44,000–2400/4160, 3 Ph.
3	500	G.E.	44,000–2400/4160
3	200	West.	44,000–480
1	5000	West.	34,500–13750/6875, 3 Ph.
1	3750	G.E.	34,400–13800/7960, 3 Ph.
2	3000	Uptegraff	34,750–4160, 3 Ph.
2	1500	G.E.	34,400–2520, 3 Ph.
3	1000	A.C.	34,650/11,500–2300
4	333	G.E.	34,650–7200/12470Y
3	200	A.C.	34,500–2400/7200/12470Y
2	1500	G.E.	23,000–2400/4800, 3 Ph
1	7500	A.C.	13,800–2400, 3 Ph.
3	2500	G.E.	13,800–2300, 3 Ph.
3	1667	G.E.	13,800–600
3	667	Kuhl.	13,800–480
1	600	Stand.	13,200–2300, 3 Ph.
1	450	Penna.	13,200–2400, 3 Ph. Askarel
1	4500	West.	7200–2400, 3 Ph.
3	333	Mol.	7200/12470–2400/4160
3	100	G.E.	7,200/12470–240/480
3	125	A.C.	6900–2300
3	100	G.E.	4800–120/240
3	400	G.E.	2300/4000–230/460
3	333	G.E.	2400/4160–600
3	100	G.E.	2300/4000–230/460

FEEDER REGULATORS—OUTDOOR

1	750	G.E.	360 A. 12000 V. 3 Ph. STEP
1	580	G.E.	694 A. 4160 V. 3 Ph. STEP
1	375	G.E.	50.2 A. 34500 V. 3 Ph. STEP
1	250	A.C.	601 A. 2400 V. 3 Ph. STEP
3	96	G.E.	200/400 A., 2400 V. 1 Ph. IND.
8	36	West.	150/300 A., 2400 V. 1 Ph. IND.

Also: FREQ. CHGRS., M-G SETS, SYn CONDENSERS, OIL CIR. BRKRS, ETC.

BREW, WOLTMAN & CO., INC.
52 Church Street, New York 7, N. Y.

TRANSMISSION AND DISTRIBUTION SUPT.

A fast growing electric utility in the West Indies has excellent opportunity for a graduate engineer with operating experience.

Permanent position at liberal salary assured to man of high caliber. Ability to speak Spanish desirable. Qualified candidate will be interviewed in field at company expense. Successful candidate will be reimbursed for expenses incurred in moving. Vacation of two months every two years with liberal transportation allowance paid by company.

Include complete resume of education, experience, present position and compensation, and family status in first letter. All applications will be treated confidentially.

P-9553, Electrical World
Class. Adv. Div., P.O. Box 12, N.Y. 36, N.Y.

LARGE POWER EQUIPMENT
Prompt Stock Shipment
RENUBILT MOTORS - GENERATORS
TRANSFORMERS - CIRCUIT BREAKERS
DO YOU GET OUR STOCK LIST?
BELYEA COMPANY, INC.
51 Howell St. Jersey City, N. J.
OL-3-3334

FOR SALE
Two (2) Westinghouse turbosets
1875 KVA and 938 KVA capacity, good condition, together with generators, condensors and necessary appurtenances. Make offer to Public Service Department, City Hall, Moorhead, Minnesota.

"SEARCHLIGHT" IS Opportunity Advertising

—to help you get what you want—to help you sell what you no longer need.

Take Advantage Of It

For Every Business Want

"THINK SEARCHLIGHT FIRST"

ESTIMATOR-ENGINEER
With electrical contracting experience in commercial, industrial and institutional work for Florida office.
POSSIBILITY OF OPENINGS IN OTHER AREAS
SALARY COMMENSURATE with experience
Write Box 469-B, 300 W. 43 St, N. Y. 36

New Advertisements

received by 10 A.M. Dec. 24th will appear in the Jan. 5th issue, subject to space limitations.

ELECTRICAL WORLD
Classified Advertising Division
P. O. BOX 12
NEW YORK 36
NEW YORK

ADDRESS BOX NO. REPLIES TO: Box No.
Classified Adv. Div. of this publication.
Send to office nearest you.
NEW YORK 36: P. O. BOX 12
CHICAGO 11: 520 N. Michigan Ave.
SAN FRANCISCO 4: 68 Post St.

POSITIONS VACANT

Wanted—University graduate Engineer with at least five years experience operation steam electric generating station for responsible position in Maracaibo, Venezuela. Preference will be given Spanish speaking applicant. Salary dependent on qualifications. P-8320.

Electrical Engineers Wanted—Graduate electrical engineers interested in substation design and construction. Experience desirable, but not required. Male. Age 22-40. Excellent opportunity to grow with rapidly expanding utility in central and northern New Jersey. Please submit resume, P-9200, Electrical World.

POSITIONS WANTED

Meter and Relay Specialist with administrative and organizational training and experience desires a challenging opportunity. Specialized training and experience in a first rate electric utility, in the testing and servicing of all types of metering and modern relay equipment, high voltage circuit breakers and central station apparatus. Best quality references furnished. PW-9404, Electrical World.

Spanish speaking E.E. experienced in manufacturing, now employed as sales manager with large company would consider managing foreign operations for electrical manufacturer. 10 years foreign residence and 10 years sales supervision. World-wide acquaintance in petroleum and allied industries. PW-9588, Electrical World.

DON'T FORGET THE BOX NUMBER

Readers Forum

Which Power Plant Criteria?

To the Editor:

The article by Prof. Baumeister, (EW, Aug. 25, p. 72) has been reviewed. In the portion dealing with an absolute criterion of excellence, covering all facets of power plant siting, fuel supply, design and operation it is easy to agree "that we will have to employ many criteria—each within its own field of utility and its own limitations." The real problem of engineering management will continue to be to properly evaluate and stress those criteria which are most pertinent to its own situation.

It would appear to be attempting the impossible to set up a single measure of over-all performance. In the final analysis, power plants are built to fit the needs and the philosophies of their owners. It is most unlikely that any single criterion, no matter how objective, would accurately portray their relative merit to the various owners.

The effort to "strip out elements which are providential and leave only those which are under control of the designer and operator" seems particularly undersirable. If the providential features are so treated, then some of the parameters which influenced the design are removed and these may have been the very essence of the design problem.

The author's case for the use of the lower calorific value of all fuels rather than the higher value seems to be special pleading for plants firing gas. This fuel already enjoys great advantages in original plant cost, ease of handling, absence of costly firing equipment, minimum boiler cleaning and air pollution problems. If other fuels and firing methods could as easily dispense with some major debit on their performance, the way would soon be prepared for computing the results of each type of plan on a basis most favorable to itself.

To take the lower calorific value in place of the higher, would be to acquiesce in the lowering of our sights. While no economic means of utilizing the difference in these values has thus far been found, there is always the possibility of progress in metallurgy and design which will make this possible.

One must hope that Prof Baumeister's article was prepared with tongue in cheek and in an effort to stimulate thinking and review, rather than to seriously propose the change which has been discussed.

T. T. Frankenberg
Mechanical Engineer
American Electric Power Service Corp
30 Church St
New York 8, N. Y.

A Thank-You from Author

To the Editor:

It would seem that the editorial of May 19th and my suggestions of August 25th had fallen on barren soil until the comments of Mr. Frankenberg were received. These comments, however, are very gratifying as they come from a man of recognized professional stature and he, presumably, speaks for an organization which has always been in the van of progressive practice in steam power generation.

It is certainly to be hoped that others representing companies which burn oil and gas in steam or internal combustion plants ashore, afloat, or aloft, will contribute their thoughts to the questions. It is by this process of "continual and fearless sifting and winnowing by which alone the truth can be found".

Theodore Baumeister
General Public Utilities Corp
67 Broad Street
New York 4, New York

Whenever you request a change of address, entry or renewal of your subscription, or information on any of our publications . . . . include your zone number.

McGraw-Hill Publishing Company
330 West 42nd St. New York 36, N. Y.

Advertising Index

Allis-Chalmers Mfg. Co. ..... 4th Cover
Anderson Electric Corp. 25

Blackburn Corp., Jasper 4
Blaw-Knox Co. 10
Brewer-Titchener Corp. 62

Central Transformer Corp. 21
Colorado Fuel & Iron Corp., Wickwire Spencer Steel Div. 93

Directory of Engineers 100

Ebasco Services, Inc. 6
Engineers, Directory of 100

Ferranti Ltd. 59
Fuller Company 20

General Cable Corp. 8, 9
General Electric Co Apparatus Dept. ...2nd Cover, 54, 55, 56, 57
Graybar Electric Co., Inc. 7
Green Fuel Economizer Co., Inc. 23

Holophane Co., Inc. 67

Hotpoint Co. 22

I-T-E Circuit Breaker Co., Switchgear Div. 30, 31

Kellogg Co., M. W. 75
Kidde & Co., Inc., Walter 66
Kuhlman Electric Co. 63

Line Material Industries 17

Marcus Transformer Co., Inc. 99
Moloney Electric Co. 32
Murray Mfg. Co., D. J. 98

Northeastern Engineering, Inc. 95

Ohio Brass Co. 28, 29

Page & Hill Inc. 94
Pennsylvania Transformer Div. McGraw-Edison Co. 11, 12
Pfaff & Kendall 60
Pioneer Service & Engineering Co. 76

Rockbestos Products Corp. 97
S & C Electric Co. 68, 69

Sargent & Lundy Engineers 61
Searchlight Section 101
Sierra Electronic Corp. 74
Simplex Wire & Cable Co. ..... 3rd Cover
Southern Electrical Corp. 64, 65
Southern States Equipment Corp. 91
Southwire Company 77

United States Rubber Co. 24
Utility Tool & Body Co. 99

Wagner Electric Corp. 72, 73
Weaver Co., J. A. 71
Westinghouse Electric Corp. 18, 19, 26, 27, 79, 80, 81, 82, 83, 84, 85, 86

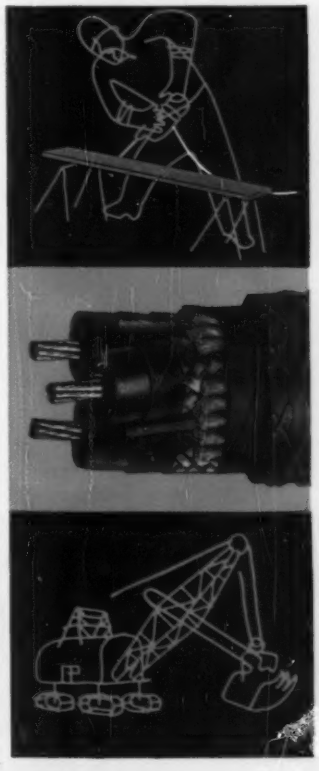
PROFESSIONAL SERVICES 100

CLASSIFIED ADVERTISING
F. J. Eberle, Business Mgr.

EMPLOYMENT OPPORTUNITIES 101

EQUIPMENT (Used or Surplus New) For Sale 101

HIGH MAINTENANCE COSTS ARE DOOMED...



when you use ultra-flexible TIREX® trailing cords and cables. Simplex TIREX cords and cables are built to "take it." In snow and mud, under water and under pressure, TIREX remains flexible, smooth, light and easy to handle, due to its original cured-in-lead construction. TIREX cords and cables, with tempered and fortified neoprene armor, assure balanced resistance to abrasion, water, acids, oils, sunlight and flame.

Whatever your power-transmitting applications – mobile mining equipment, construction machinery or portable tools – you can depend on TIREX.

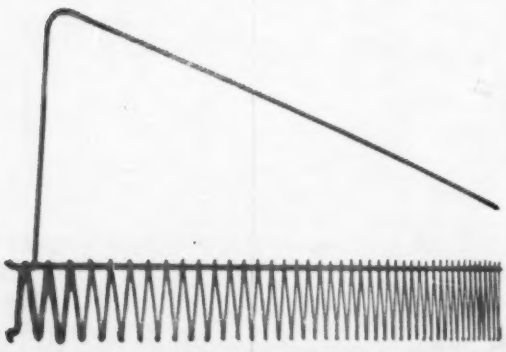
"Built like the finest, toughest automobile tires."

Simplex

LIVE BETTER ELECTRICALLY

WIRE & CABLE COMPANY

79 Sidney Street, Cambridge 39, Mass.



There's a good reason WHY...

Allis-Chalmers combines

AUTOMATIC FAULT DETECTION

with impulse testing

FAULT-FREE

distribution transformers

EVEN the smallest fault triggers a flashing red light and an alarm bell during impulse testing of Allis-Chalmers distribution transformers.

The new automatic fault detector eliminates chance for human error in impulse testing . . . adds assurance that the overall strength of insulation meets all standards . . . that the insulation will withstand severe lightning and surge conditions. The enviable record of operating reliability of these distribution transformers vindicates Allis-Chalmers insistence 10 years ago that all pole-type distribution transformers be impulse tested. Today all Allis-Chalmers distribution transformers, from 3 to 500 kva, are quality control tested on the production line.

For *all* the good reasons why Allis-Chalmers distribution transformers assure outstanding performance for many years, call your A-C man, or write Allis-Chalmers, Power Equipment Division, Milwaukee 1, Wisconsin.

ALLIS-CHALMERS A-C ALLIS-CHALMERS

A-5715